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INDIA RUBBER WORLD

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Control Instruments in the Rubber Industry

C. R. De Arman [1]

PROCESS instrumentation is one of the most significantly useful tools that has aided in the development of the rubber industry to the position it now occupies, that is, the use of recording, indicating, and controlling instruments in the various phases of processing. Automatic control, outstanding among which are the instruments for process cycle control, was first used in the rubber industry around 1923. About that time new methods, particularly the use of accelerators, reduced the necessary time for vulcanizing, in some cases to about one quarter of the time previously required. This shortened cure made the time element more critical than ever before and created the need of more accurate control than with the older methods, when the operator referred to a recording or indicating thermometer and accordingly regulated the temperature by the hand adjustment of a valve. It was found desirable to have an automatic controller which, at exactly the proper time in each sequence of the process, would actuate or engage the necessary mechanical, electrical, or pneumatic devices to perform the desired operation. The answer to this need came in the form of an instrument, now known as a cycle controller, which in conjunction with other controlling and recording instruments has set new standards for efficient production and uniform quality.

Description is given below of the mechanics and application of several different types of control instruments used in connection with the drying, mixing, calendering, and vulcanizing of rubber products according to present everyday practice.

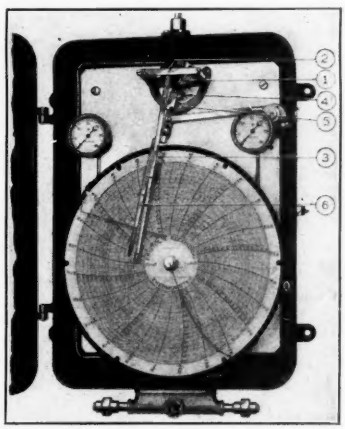


Fig. 1. Air-Operated Temperature Controller

Automatic Control for Drying Crude Rubber

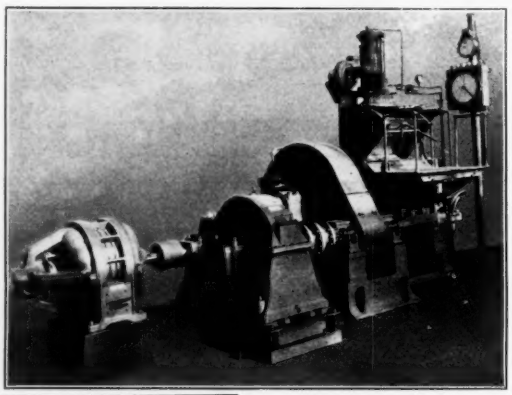
Methods for drying washed crude rubber employ automatic control equipment in addition to temperature and pressure recorders. Many of the controllers used are of the air-operated type. These instruments effect uniform temperature control by throttling a constant supply of air to a diaphragm valve in the line of the medium being controlled.

An inside view of an air-operated temperature recorder controller is shown in Figure 1. For recording, the instrument uses the thermometer actuating element (1), the shaft (2), and the pen-arm (3). A thin vane (4) is also attached to the shaft (2), and as the shaft rotates in response to changes in temperature, this vane passes between two small nozzles at (5), which are discharging opposing jets of air. The throttling action at the air jets transmits the resulting change in pressure back to a metal diaphragm (concealed behind the chart plate), which in turn operates a small pilot valve (also concealed), with its stem resting on the diaphragm. The pilot valve opens or closes, in proportion to the movement of the diaphragm. In this way air is admitted to the diaphragm of the valve in the line of the medium being controlled and is throttled by movements of the pen-arm. The setting of the control pointer (6) at the proper temperature on the chart determines the position of the air jets in relation to the thin

[1] With The Bristol Co., Waterbury, Conn.

vane on the shaft of the recording arm. In an air-operated recording pressure controller the control mechanism is identical; pen-arm movements are obtained through a suitable pressure element on the shaft (*2*).

In the three general types of crude rubber driers now used automatic temperature or pressure control is obtained by means of instruments of this type or of similar design. In the dry air process the temperature is automatically maintained within predetermined limits, by means of a pneumatic temperature controller, with the controlled diaphragm valve operating a damper which allows unheated air to mix with the heated air as it enters the drier. The flow of steam to the heating coils is automatically controlled by a diaphragm valve in the steam line. In the case of the humidified-air drier the temperature is maintained by automatic control of the steam through the coils used to heat the air. The percentage relative humidity, indicated on a wet- and dry-bulb temperature chart, is manually controlled by regulating the water spray. In the vacuum drier for soft rubbers the temperature is regulated through a controller operating a diaphragm valve in the steam line to the heater. The reduced pressure is regulated by controlling the operation of a vacuum pump.



Farrel-Birmingham Co., Inc.

Fig. 2. Banbury Mixer

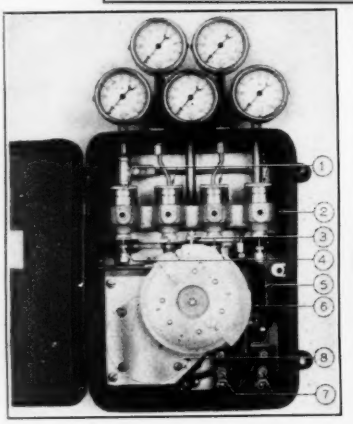


Fig. 3. Single-Cam Process Cycle Controller

Temperature Control in Mixing

When mixing rubber, it is essential that the temperature of the rubber remain below a critical value. This condition is accentuated most in the Banbury mixer which is built with a system for manually cooling the rubber by circulating cold water through the rolls or in a water jacket around the outside. A recording thermometer gives a complete and permanent record of the temperature conditions inside the machine during the run and serves as a guide for the operator in cooling the mixture.

The Banbury mixer is also equipped with a process time signal indicator and controller as shown in Figure 2. During the mixing at a definite time set on the controller colored signal lights indicate when to add a new ingredient. When the process is completed, an alarm system warns the operator and a door is automatically opened to discharge the mixed rubber batch. The door is then automatically closed, and the machine is ready for another charge.

When mixing on mills, the temperature of the mill rolls can be determined as described under calendering.

Temperature Control in Calendering

It is highly important that the temperature of calender rolls be controlled within predetermined limits. An indicating portable pyrometer with suitable leads to a special ribbon-type thermocouple is used to check the roll temperature at definite intervals. The ribbon thermocouple consists of two strips of base metal (Iron-Constantan), stretched between and fastened to insulating blocks at the ends of a curved strip of metal. This unit is attached to the end of a wooden handle about three feet in length. When the thermocouple ribbons are pressed firmly against the roll, the flexibility of the metal holding the ribbons permits complete contact between the entire length of the ribbons and the calender roll. The thermocouple is removed as soon as the reading has been made. By manual operation cold water or steam is circulated through the calender rolls, as is necessary to produce the desired roll temperature.

Single-Cam Cycle Controllers for Tire Presses

A single-cam cycle controller operating four pilot valves in sequence is shown in Figure 3. The use of this instrument to operate a tire or tube press makes it possible to: (1) close the press automatically, (2) admit steam or hot water to the inside for the cure, (3) shut off the curing medium, and (4) open the press.

The basis of operation of a cycle controller is the revolution of a cam cut to provide the operations necessary during the cycle and driven by a small synchronous motor through a set of gears. The operations can be varied to a limited extent by the proper use of cam segments. A rider, moving over the outer edge of the cam, opens and closes pilot air valves, or operates switches that make and break electrical contacts, in accordance with a definite schedule. Pilot valves in turn operate diaphragm valves in the line of the medium under control; electric switches control electrically operated equipment. When the various steps are performed in a given sequence and operate to be stopped in the reverse order, a single-cam controller is used. If one or several operations are repeated or if the starting and the stopping of the operations overlap, a multiple-cam cycle controller is applied.

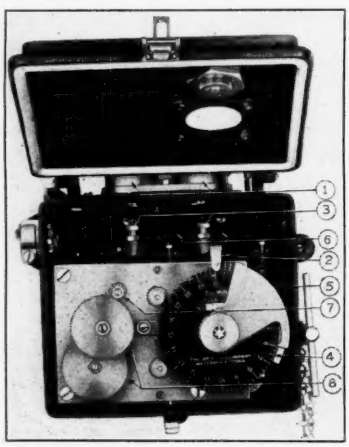


Fig. 4. Single-Cam Variable-Cure Process Cycle Controller

Pilot valves on cycle controllers provide for air to be admitted through one opening at 15 pounds' pressure. When the valve stem rises, it allows air to pass to the diaphragm valve in the line of the medium under control in proportion to the opening made by the valve stem as it rises. When it closes again, the entrapped air escapes through a special opening in the valve stem. Thus the usual continuous loss of air through leakage, is now lim-

ited to the air entrapped between the diaphragm valve being closed and the pilot valve when the position changes.

Referring again to Figure 3, as the cam (6) rotates at constant speed through the gear drive at (8), the rider (3) causes each of the four pilot valves (1) to open by means of the tappets (4). Air, at 15 pounds' pressure, is applied to the top of each three-way leakless pilot valve through a manifold (2), and each of the gages indicates the pressure when its respective pilot valve is opened. As each of these pilot valves opens, air is admitted to the top of a diaphragm valve located in the line containing the medium being controlled. Thus pressure is exerted on the diaphragm valve, to hold it open or closed, during the time the cam holds open the pilot valve. A pneumatic switch (5) is used as a protective device to stop automatically the operations in the event that the air supply fails. Power for the motor is supplied through electrical terminals (7).

Summit Mold & Machine Co.

Fig. 5. Electric Tube Press

Figure 4 shows another type of single-cam cycle controller, Fig. 4 with two pilot valves indicated at (1). This instrument employs a small synchronous motor at (7) (concealed in the back) to drive the cam (4) at a rate dependent upon the gears (8) with which it is equipped. These gears may be changed for other constant speeds, within certain limits. As the cam follower (2) rises on the cam, it opens the pilot valves at (1) through contact between the tappets (3) and the valve stems extending below the pilot valves. The switches at (6), of special design, are used to operate a relay in the instrument to lock-in the electrical circuit that operates the motor driving the cam. The cam segments (5) are used to vary the length of the cure.

With the cam in position for starting the cure, the cycle controller begins its operations when the press closes. In rising to the highest level on the cam the follower opens first one and then the other pilot valve and remains on this level for the cure while the cam rotates at constant slow speed as determined by the gears (8) with which the controller is equipped. Opening each of the pilot valves operates a diaphragm valve in the line of the medium being controlled. At the end of a set period the rider drops sufficiently to close one pilot valve and continues to rotate at the same speed until it drops to the lowest level on the cam. At this instant, by means of a special operating feature, the cam begins to rotate at fast speed, from 100 to 400 times faster, until the cam follower reaches the reset position quickly, where it rests until another cycle is started. As many as four pilot valves are operated by cycle controllers of this type, with the necessary changes in instrument case design. Often an application requires the operation of only one pilot valve; in which case the other valve may be disconnected. This cycle controller provides flexible operating features in that the cure time may be easily varied by means of movable cam segments (6), or the gear ratios may be changed for wider ranges. The special two-speed feature provides for quick reset, which proves invaluable in some applications.

An electrically operated press for curing tire inner tubes is shown in Figure 5. It is equipped with a variable-cure cycle controller as shown in Figure 4, using only one pilot valve. The control instrument is mounted at the top; a switch box with push buttons for starting and stopping is located to the left, and below these is mounted an enclosed relay for operating the electric motor that opens and closes the press when its direction of rotation is reversed.

When started, the rotation of the cycle controller cam opens the pilot valve, which controls a diaphragm valve in a compressed air supply line connected to the tube inside the mold. This inflates the tube and maintains a definite pressure inside during the cure. The mold is continuously heated by steam, and the cure, which may be varied by means of adjustable cam segments, begins as soon as the press closes. After curing the tube for the proper length of time the rider drops to the lowest level on the cam and in so doing closes the pilot valve; this allows the tube to deflate. The controller motor then turns the cam at fast speed until it stops with the rider in the reset position. The mold is then opened, and the cured tube is ready for inspection and packing.

For curing tires the same type of press and cycle controllers are used, with the necessary tire tread design inside the mold. The control problem here is similar to that required for the curing of tubes. It is often necessary, however, to provide for the use of more than one heating medium for the inside of the tire, that is, some combination of steam and hot water, or air and one of these two, successively applied to a bag or tube inside the tire. The variable-cure cycle controller shown in Figure 4, with both pilot valves, is used for these operations.

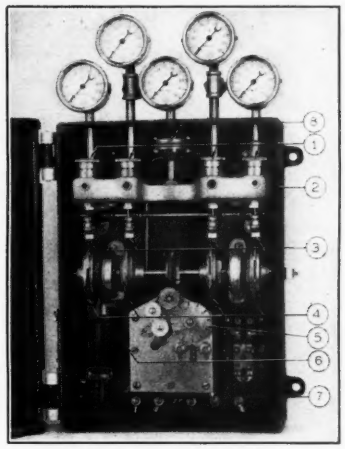


Fig. 6. Multiple-Cam Process Cycle Controller

Multiple-Cam Cycle Controllers for Tire and Platen Presses

To meet the need for repetition of operations during a cycle, or for the starting and stopping of several operations at intervals which may overlap, the multiple-cam type cycle controller is used. For example, one type of electric tire press uses a four-cam cycle controller which provides for closure of the press, steam blow-down, cure by the required medium inside the press, second steam blow-down exhaust, and opening of the press. Figure 6 shows a multiple-cam cycle controller used for performing such operations.

A small synchronous motor turns the shaft at constant speed through the gear train (5). The cams (4), with adjustable segments, operate the pilot valves (1) through the cam followers (3) and the pilot valve stems resting on the tappets. Air at 15 pounds' pressure enters the manifold (2) through the air filter (8) and is supplied to each of the pilot valves. The air switch (6) is used

as a protective device to stop the operations automatically, in case the air supply fails. The terminals (7) are for power supply to the motor.

Multiple-cam cycle controllers are also used to control the operation of platen presses. Figure 7 shows a platen press operating under the control of a four-cam cycle controller. The instrument operates pilot valves to: (1) close the press under low pressure, (2) lock the plates under high pressure, (3) "bump" the press by cutting the high pressure for an instant and releasing the gases that accumulate in the mold, and (4) remove pressure from the press and open the plates.

Control of Chamber Vulcanizers

Considerable progress has been made in instrumentation for the operation of chamber vulcanizers, using live steam admitted to the interior of the heater, or where steam heated coils raise the temperature of the air in the chamber for the curing medium.

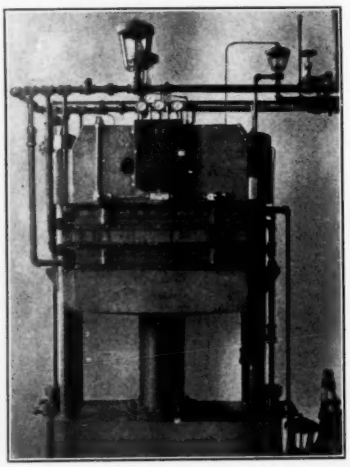


Fig. 7. Platen Press with Cycle Controller

Vulcanizers using steam heated coils are usually equipped with indicating pressure gages for the interior of the chamber and air-operated pressure controllers for a constant supply of steam to the coils. Recording thermometers, having their actuating-system bulbs at representative points in the vulcanizer, give a chart record of the temperature. Recording air-operated pressure controllers, as shown in Figure 1, are generally used to control the steam pressure in the coils, but in some cases a capsule-spring pneumatic non-indicating controller is applied. This instrument also operates to throttle a constant supply of air; by means of a capsule spring or bellows which expands and contracts with changes in pressure inside, it throttles or permits air to flow through the instrument to the diaphragm valve in the steam supply line.

In live steam heaters or autoclaves for vulcanizing, the temperature is usually controlled at a constant value by means of a recording air-operated temperature controller, as in Figure 1, or by an expansion-stem controller. The latter is also a pneumatic-type controller; changes in temperature at the bulb, which extends from the rear of the instrument, cause a metal stem to expand or contract, and by means of a special mechanical arrangement these changes vary the pressure in an air line connected to a diaphragm valve in the steam supply line.

In many vulcanizer units a time-temperature cycle is maintained, instead of a constant temperature, during the process. The temperature is raised gradually and held at a definite value for a period of time and then lowered, for opening the vulcanizer and removing the cured product. A time-temperature air-operated controller is used to effect a cure of this type.

Essentially this controller operates the same as the air-operated recorder controller in Figure 1, that is, a thin vane throttles a supply of air to the diaphragm of a valve in the steam line to the vulcanizer. Instead of a pointer, as shown at (6), for setting the control point on a chart the instrument is equipped with a cam follower and metallic cam, set in the same position as the chart in Figure 1. The cam is marked with the same divisions as the chart of a temperature recorder and is cut in accordance with the desired schedule of temperature change. The thin vane (4) is on the shaft of the cam rider, and as the cam rotates by means of a clock mechanism it varies the position of the vane with respect to the nozzles (5).

With an instrument of this type, and a floating diaphragm valve in the steam line to the vulcanizer, air is admitted gradually to the diaphragm valve so that the latter opens gradually and admits steam for the cure. At the end of the cure it closes off the steam supply, and the vulcanizer is opened for the removal of the product.

Pot-Heater Vulcanizer Control

Although much of the tire curing now done in rubber mills is carried out in individual tire presses, as previously described, the pot-heater type of vulcanizer is still in use. Figure 8 shows a panel for the control and automatic operation of a pot-heater. The instruments on the panel are as follows:

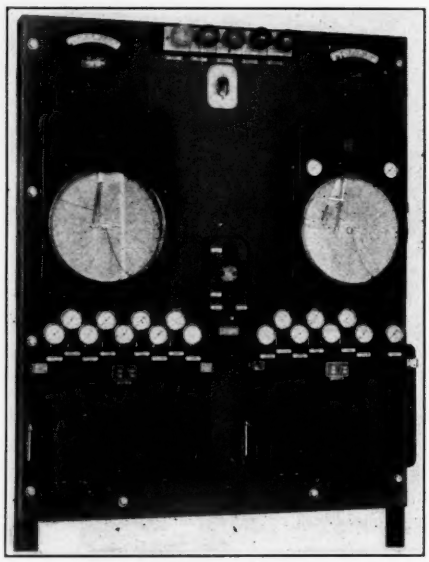


Fig. 8. Panel for Pot-Heater Control

(1) An indicating temperature electric controller is shown on the panel at the top, left. The instrument has a regular thermometer vapor - tension system with temperature-sensitive bulb. The indicator arm, when actuated by changes in temperature at the bulb, makes contact with the high or low control pointer and makes or breaks an electric circuit through solid metal contacts. The control pointers are adjustable from the outside of the instrument case.

(2) An indicating pressure electric controller is shown on the panel at the top, right. The instrument has a regular pressure element. The indicator arm, when actuated by changes in pressure of the medium being controlled, makes contact with the high or low control pointer and makes or breaks an electric circuit through solid metal contacts. The control pointers are adjustable from the outside of the instrument case.

(3) A two-pen pressure and temperature recorder is mounted on the panel to the left. The instrument has two complete systems, one for pressure and one for temperature and both are calibrated for reading on the same chart, with suitable ranges.

(4) A two-pen air-operated recording temperature controller is shown on the right side of the panel. The operation of this instrument is identical with that of the controller in Figure 1. There are two complete temperature

systems with control pointers and pen-arms, using the same chart for recording.

(5) Two multiple-cam cycle controllers are mounted on the panel. These are identical, in construction and operation, with the type shown in Figure 6, except for the number of cams used to operate pilot valves. The controller to the left has one gear-drive mechanism and operates eight pilot valves. The instrument to the right has two control systems with separate gear drives. One controls the cycle of operations, using six pilot valves; and the other, operating only one pilot valve, controls the cure.

(6) In the center at the top of the panel are signal lights, and below these is a manual control switch-box for starting, stopping, resetting, and rejecting.

To start the cycle of operations preliminary for the cure the operator opens the hydraulic valve manually and the indicating pressure electric controller, described under (2) above, starts the standard cycle controller, at the right on the panel, as soon as the pressure reaches the value at which the pressure control pointer is set. By opening and closing pilot valves, this cycle controller closes the exhaust valve on the heater, admits steam to the bags inside the tires in the vulcanizer molds, admits steam to the shell of the heater around the molds, closes the steam supply to the bags, and admits air under pressure to the inside of the bags.

In a series of tests for one minute each air is entrapped in the bags to check for leaks. The pressure and temperature in the bags is recorded on the two-pen instrument described under (3) above. If the bags do not leak, so as to necessitate rejecting, the cure continues for the duration of a set time. The cure controller is started automatically, by means of the indicating temperature electric controller, described under (1) above, when the temperature in the shell reaches a set value. The two-pen air-operated recording temperature controller described under (4) above then regulates the temperature of the cure, having the bulb of one system in the shell of the heater and one in the condensate in order to control the opening of the discharge valve.

At the end of the cure the cycle controller operates to open the cold water spray valve, open the drain valve, close the spray valve, and remove the air pressure from the bags by closing the supply and opening the exhaust. To end the cycle the controller releases pressure from the cylinder, closes the drain valve, and automatically stops in the reset position for starting. The operator then shuts off the hydraulic pressure when it reaches a definite value, indicated by a light.

If the bag leak is found to be excessive, the operator pushes the "Reject" button and the second cycle controller to the left on the panel and described in (5) above starts operating to shut off the steam supply to the heater, spray the molds, open the drain, close the spray valve, and close the drain. The cycle controller then stops. The cure controller continues to run, without admitting steam to the heater, until it stops at the end of the time set for the cure. Air to the bags is then shut off and released. Air to the cylinder is released, and the cycle controller stops in the starting position. The arrangement provides for various protective and safety features as well as a series of colored lights, for signals and indications of the existing conditions.

This description of the use of recording and control instruments in the rubber industry constitutes only a small number of the applications where the general principles as outlined have been applied to equipment in use in the modern rubber factory. From time to time improvements are being made so that automatic control may be more extensively used to perform for the rubber manufacturer in producing consistently uniform products to meet the exacting specifications to which they must conform. It is reasonable to assume that the field of application will be greatly broadened in the future.

Correction

REFERRING to the May 1, 1937, issue of INDIA RUBBER WORLD, page 48, a part of the article "Swelling and Solvation of Rubber in Different Solvents," Figure 1 contained an error through which the plotted curves for Benzotrifluoride and Chlorbenzene were interchanged.

Below is reprinted a corrected Figure 1 presenting the proper relation and location of the four curves charted to show fractional increases in viscosity of rubber solutions.

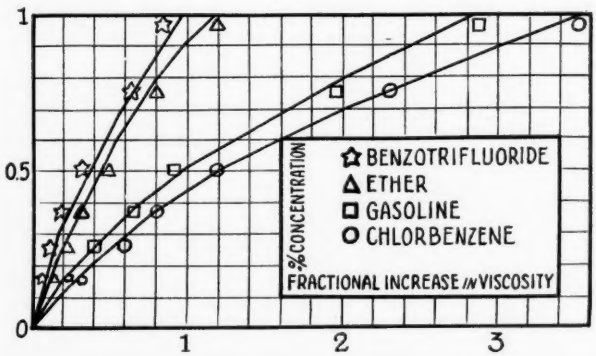


Fig. 1. Fractional Increases in Viscosity of Rubber Solutions

U. S. Exports of Rubber Goods Up[1]

EXPORTS of rubber manufactures by the United States totaled $7,288,476 in the first three months of 1937, 32.4% ahead of the figure of $5,505,684 for the first quarter of 1936, and 27.4% greater than that for the same period of 1935.

Imports of rubber manufactures in the first quarter of 1937 were valued at $532,931, against $677,559 in the same period of 1936 and $344,166 in that of 1935. Most important items imported by the United States includes golf balls, tennis balls, other play balls, canvas rubber-soled shoes, rubber belting for machinery, toys, swimming tubes and floats, and other rubber goods able to complete on a price basis with our domestic manufacturing industry.

VALUE OF UNITED STATES EXPORTS OF RUBBER GOODS

Item	First Three Months 1936	1937	% Increase
Tires, tubes, solids, and tire-repair materials.	$2,807,211	$3,604,453	28.4
Rubber footwear, soles, and heels	206,154	287,994	39.7
Rubber belting, hose, and packing	885,959	1,295,525	46.2
Rubberized fabrics	166,891	257,149	54.1
Rubber sundries and specialties	378,134	565,174	49.5
Hard rubber products	116,065	148,545	28.0
Rubber cement, reclaimed rubber, scrap rubber and rubber thread	583,807	669,200	14.6
Gutta-percha manufactures	40,625	92,382	127.4
Other rubber manufactures	320,838	368,054	14.7
Total	$5,505,684	$7,288,476	32.4

[1] *Commerce Reports*, May 15, 1937.

Census of Manufactures: 1935 Rubber Products

MANUFACTURERS of rubber goods in the United States reported small increases in employment and substantial increases in production (as measured by value) in 1935 as compared with 1933, according to preliminary figures compiled from the returns of the Biennial Census of Manufactures taken this year, recently released by Director William L. Austin, of the Bureau of the Census, Department of Commerce, Washington, D. C.

The number of wage earners employed in rubber manufacturing establishments in 1935 was 114,612, an increase of 7.8% as compared with 106,283 reported for 1933 (the last preceding Census year), and their wages, $133,659,754, exceeded the 1933 figure, $99,116,552, by 34.9%. The total value of the products made in the group of Rubber Goods industries in 1935 was $677,437,237, an increase of 43.3% over the 1933 figure, 472,743,587. The largest increase in value of products was shown for establishments in the Tire industry, 49.0%, from $299,313,263 in 1933 to $446,091,602 in 1935. The total production of motor vehicle tires (not including those for motorcycles) decreased 35% from 69,765,223 in 1929 to 45,375,552 in 1933, and increased 7.5% to 48,764,713 in 1935.

Manufacturers of rubber products are assigned, for Manufactures Census purposes, to three industry classifications: namely, Rubber Tires and Inner Tubes; Rubber Boots and Shoes; and Rubber Goods Other than Tires, Inner Tubes, and Boots and Shoes.

Statistics for 1935, with comparative figures for 1933 and 1929, are given in the following tables. All figures for 1935 are preliminary and subject to revision.

TABLE 1. SUMMARY FOR THE INDUSTRIES: 1935, 1933, AND 1929

(Because they account for a negligible portion of the national output, plants with annual production value under $5,000 have been excluded since 1919)

	1935	1933	1929	% of Increase or Decrease (—) 1933-1935	% of Increase or Decrease (—) 1929-1935
The Group as a Whole					
Number of establishments	465	408	525	14.0	—11.4
Wage earners (average for the year)*	114,612	106,283	149,148	7.8	—23.2
Wages†	$133,659,754	$99,116,552	$207,305,857	34.9	—35.5
Cost of materials, containers, fuel, and purchased electric energy†..	$368,478,339	$211,396,716	$578,677,681	74.3	—36.3
Value of products†.	$677,437,237	$472,743,587	$1,117,460,252	43.3	—39.4
Value added by manufacture‡	$308,958,898	$261,346,871	$538,782,571	18.2	—42.7
Rubber Tires and Inner Tubes Industry					
Number of establishments	42	44	91	§	§
Wage earners (average for the year)*	57,128	52,976	83,263	7.8	—31.4
Wages†	$78,253,489	$54,737,313	$127,081,975	43.0	—38.4
Cost of materials, containers, fuel, and purchased electric energy†..	$265,515,401	$139,392,070	$429,606,971	90.5	—38.2
Value of products†.	$446,091,602	$299,313,263	$770,176,890	49.0	—42.1
Value added by manufacture‡	$180,576,201	$159,921,193	$340,569,919	12.9	—47.0
Rubber Boots and Shoes Industry					
Number of establishments	12	13	22	§	§
Wage earners (average for the year)*	17,246	18,102	25,659	—4.7	—32.8
Wages†	$16,113,490	$14,440,403	$29,945,265	11.6	—46.2
Cost of materials, containers, fuel, and purchased electric energy†..	$20,729,996	$14,124,109	$34,396,466	46.8	—39.7
Value of products†.	$53,162,121	$42,018,877	$102,537,625	26.5	—48.2
Value added by manufacture‡	$32,432,125	$27,894,768	$68,141,159	16.3	—52.4
Rubber Goods Other Than Tires, Inner Tubes, and Boots and Shoes Industry					
Number of establishments	411	351	412	17.1	— 0.2
Wage earners (average for the year)*	40,238	35,205	40,226	14.3	¶
Wages†	$39,292,775	$29,938,836	$50,278,617	31.2	—21.8
Cost of materials, containers, fuel, and purchased electric energy†..	$82,232,942	$57,880,537	$114,674,244	42.1	—28.3
Value of products†.	$178,183,514	$131,411,447	$244,745,737	35.6	—27.2
Value added by manufacture‡	$95,950,572	$73,530,910	$130,071,493	30.5	—26.2

*Not including salaried officers and employes. The data for such officers and employes will be included in a later report. The item for wage earners is an average of the numbers reported for the several months of the year. In calculating it, equal weight must be given to full-time and part-time wage earners (not reported separately by the manufacturers), and for this reason it exceeds the number that would have been required to perform the work done in the industry if all wage earners had been continuously employed throughout the year. The quotient obtained by dividing the amount of wages by the average number of wage earners cannot, therefore, be accepted as representing the average wage received by full-time wage earners. In making comparisons between the figures for 1935 and those for earlier years, the possibility that the proportion of part-time employment varied from year to year should be taken into account.

†Manufacturers' profits or losses cannot be calculated from the census figures because no data are collected for certain expense items, such as interest, rent, depreciation, taxes, insurance, and advertising.

‡Value of products less cost of materials, containers, fuel, and purchased electric energy.

§Per cent not computed where base is less than 100.

¶Less than one-tenth of 1%.

TABLE 2. PRODUCTS, BY KIND, QUANTITY, AND VALUE: 1935, 1933, AND 1929

	1935	1933	1929
1. Rubber products group of industries, total value	$677,437,237	$472,743,587	$1,117,460,252
2. Rubber goods	667,243,773	465,309,741	1,109,863,874
3. Other products (not normally belonging to the industries)	10,193,464	4,480,077	7,596,378
4. Rubber goods and other products not reported separately (on abridged schedule)*	.....	2,953,769	.....
5. Rubber goods made as secondary products in industries outside this group	†	3,305,223	1,766,630
Rubber goods, aggregate (sum of 2 and 5)	$667,243,773‡	$468,614,964	$1,111,630,504
(a)—			
Tires and inner tubes, total value	$370,347,474	$256,512,514	$676,909,812
Pneumatic tires and casings: Motor vehicle, except motorcycle and bicycle: Total number	48,764,713	45,375,552	69,765,223
Total value	$319,034,157	$221,050,854	$573,527,425
Passenger car.....No.	42,479,133		
Value	$219,326,608		
Truck and bus .....No.	6,003,338		
Value	$98,928,747	§	§
Airplane .....No.	28,086		
Value	$444,684		
All other .....No.	254,156		
Value	$334,118		

Rubber Goods—(*Continued*)

	1935	1933	1929
Motorcycle and bicycle:			
Single-tube tires ....*No.*	2,338,767		
Value	$1,689,969		
Casings .....*No.*	1,667,709		
Value	$2,000,351		
Inner tubes:			
Passenger car, truck and bus .....*No.*	47,760,679	46,811,770	77,779,858
Value	$43,816,374	$31,715,479	$84,209,685
Airplane .....*No.*	20,242		
Value	$67,059		
All other, including motorcycle and bicycle, *No.*	1,529,790		
Value	$659,295		
Solid and cushion tires:			
Truck and bus for highway transportation ...*No.*	36,790		
Value	$1,517,759		
Industrial truck, tractor, and trailer .....*No.*	116,852		
Value	$844,992	$3,746,181¶	$19,172,702¶
All other (including carriage and other tiring).....*No.*	6,993,794		
Value	$717,518		
(b)—			
Boots and shoes, total value.	$48,261,613	$41,513,460	$111,359,622
Rubber-soled canvas shoes, *Prs.*	23,955,089	29,689,163	43,954,011
Value	$12,342,790	$13,813,171	$30,335,279
Rubber Boots .....*Prs.*	3,029,126	2,622,311	5,453,865
Value	$5,534,346	$4,658,534	$16,140,851
Lumbermen's pacs ...*Prs.*	1,880,728	1,201,189	1,817,078
Value	$3,362,006	$1,661,145	$4,171,728
Arctics and gaiters:			
Buckle and automatic, except style .....*Prs.*	4,776,853		
Value	$6,788,272	15,814,586	19,244,673
Style, rubber or cloth.Prs.	14,568,750	$13,374,148	$31,722,333
Value	$10,796,311		
Other shoes, rubbers, and footholds .....*Prs.*	16,583,175	15,968,426	30,294,867
Value	$9,437,888	$8,006,462	$28,989,431
(c)—			
Rubber goods other than tires, inner tubes, and boots and shoes, total value	$248,634,686	$170,588,990	$323,361,070
Rubber heels, made for sale as such .....*Prs.*	278,369,016	272,504,312	292,719,416
Value	$11,594,192	$11,119,047	$17,926,991
Rubber soles, including composition or fiber, made for sale as such, *Prs.*	59,655,749	91,994,794	46,188,879
Value	$7,258,594	$8,315,846	$8,959,690
Rubber-soling strips and top-lift sheets..*Sq. Ft.*	9,943,849	10,752,949	4,313,026
Value	$2,667,089	$1,711,451	$1,717,212
Rubberized fabrics, made for sale as such, total value	$19,933,310	$18,197,918	$29,754,104
Automobile and carriage, *Sq. Yds.*	5,227,135	8,620,009	22,407,668
Value	$1,873,614	$3,361,918	$11,864,090
Raincoat .....*Sq. Yds.*	19,346,381	18,064,141	25,575,960
Value	$4,236,852	$5,455,614	$9,681,803
Hospital sheeting..*Sq. Yds.*	2,509,073	2,239,984	3,048,105
Value	$838,641	$740,831	$1,444,348
All other .....*Sq. Yds.*	43,624,069	42,326,587	41,935,695
Value	$12,984,203	$8,639,555	$6,763,863
Mechanical rubber goods:			
Rubber belting:			
Transmission (flat), *Lbs.*	15,449,275	13,745,112	21,574,539
Value	$8,926,384	$6,512,277	$13,146,125
Conveyer and elevator.*Lbs.*	16,347,418		
Value	$4,545,938		
Fan belts ..... *Lbs.*	12,533,594	16,882,692	23,449,031
Value	$5,552,461	$6,416,181	$12,630,320
All other .....*Lbs.*	3,900,833		
Value	$1,413,294		
Rubber hose:			
Garden .....*Lbs.*	31,902,708	*a*	*a*
Value	$4,113,124	$3,783,080*b*	$9,049,483
Fire Hose .....*Lbs.*	7,269,635	*a*	*a*
Value	$3,599,019	$2,622,418	$5,988,345
Airbrake, airline, and other pneumatic..*Lbs.*	10,109,049		
Value	$3,363,295		
All other rubber hose, *Lbs.*	44,286,800	*a* $10,356,068	*a* $22,399,751
Value	$13,306,963		
Rubber tubing .....*Lbs.*	13,607,924	13,280,049	16,235,064
Value	$2,235,798	$1,312,507	$3,494,446
Rubber packing .....*Lbs.*	10,915,570	9,328,083	17,923,100
Value	$2,588,695	$1,872,387	$5,032,921
Washers, gaskets, valves, pump sleeves, liner strips .....*Lbs.*	5,168,301	3,811,441	13,320,192
Value	$2,106,441	$1,473,651	$5,107,348
Rubber and friction tape, *Lbs.*	12,380,235	11,439,375	20,426,381
Value	$2,851,788	$2,134,313	$4,950,125
Rubber-covered rolls (all sizes), value	$3,727,742	$2,660,551	$2,528,375

Rubber Goods—(*Continued*)

	1935	1933	1929
Plumbers' rubber goods, value	$1,127,953	$15,870,856	$1,041,470
Other mechanical rubber goods, value	$31,183,520		$30,479,563
Hard rubber goods except druggists' sundries, total value	$14,023,739	$9,927,599	$17,937,397
Battery jars, boxes, and parts, value	$6,782,740	$4,338,731	$5,809,715
Mouthpieces for pipes and cigar and cigarette holders, value	$283,984		
Other (including combs), value	$6,957,015	$5,588,868	$12,127,682
Druggists' and medical sundries (except rubber gloves):			
Water bottles and fountain syringes ...*Dozs.*	575,462	552,039	692,638
Value	$2,469,810	$2,191,156	$4,959,599
Nipples and pacifiers.*Gross*	474,004		
Value	$1,196,219		
All other (including medical and surgical hard rubber goods), value.	$3,931,651	$3,564,437	$5,986,062
Rubber erasers, except pencil plugs.....*Lbs.*	1,003,525	*c*	*c*
Value	$521,038	*d*	*d*
Rubber bands.....*Lbs.*	3,812,094	3,308,968	3,488,731
Value	$1,241,891	$809,813	$1,955,005
Rubber gloves:			
Surgeons' .....*Doz. Prs.*	443,556	333,703*b*	473,547
Value	$897,783	$618,899*b*	$991,083
Electricians' ...*Doz. Prs.*	23,143		
Value	$226,265		
Other rubber gloves, *Doz. Prs.*	821,074	675,825	576,619
Value	$1,733,371	$1,057,297	$1,936,739
Rubber cement .....*Gals.*	5,518,141	3,742,018*b*	6,050,393
Value	$2,851,984	$2,099,595*b*	$4,697,407
Rubber flooring (tile or sheet) .....*Sq. Ft.*	5,905,877	4,325,019	8,565,615
Value	$1,704,421	$1,237,010	$4,267,010
Rubber mats and matting, value	$8,959,476	$3,926,486	$8,805,670
Tire sundries and repair materials, including camelback	$14,035,000	*d*	*d*
Rubber thread .....*Lbs.*	5,415,381	4,809,008	5,726,490
Value	$2,550,833	$2,236,011	$5,189,600
Jar rings .....*Gross*	7,571,331	7,441,700	8,437,696
Value	$2,072,401	$1,784,407	$3,001,475
Bathing caps .....*Dozs.*	945,211	1,228,276	1,090,054
Value	$1,167,456	$1,338,278	$1,842,401
Sponge-rubber products not elsewhere classified, value	$4,237,980	$1,489,832	*d*
Other manufactures of rubber, value	$42,014,320*e*	$43,949,619	$87,585,353*f*
Reclaimed rubber produced, including that transferred to other plants of the same company, *Lbs.*	241,919,685	*c*	*c*
Value	$10,703,448	*d*	*d*

* An abridged schedule, which did not provide for reporting production in detail, was used for canvassing the smaller establishments in the "Rubber goods other than tires, inner tubes, and boots and shoes" industry in the 1933 Cenus.

† Not yet available; will be included in final report.

‡ Incomplete (see footnote†). Corresponding total in final report will include value of secondary production in other industries.

§ No data.

¶ Includes data for a small quantity of casings and tubes other than those for motor vehicles, motorcycles, and bicycles.

a Data incomplete.

b Incomplete. Small establishments canvassed with abridged schedule. (See footnote*.)

c No comparable data.

d Included in figure for "Other manufactures of rubber."

e Includes value of rubber clothing, $10,174,176; toy balloons, $1,338,128; and play balls and other rubber toys, $4,877,521. The total value of rubber clothing made in the Rubber and Wearing Apparel industries is given in the report on men's clothing, and the total value of rubber toys in the report on "Toys (not including children's wheel goods or sleds), games, and playground equipment."

f Includes data for items covered by footnote *d* and therefore is not comparable with figures for 1933 and 1935.

TABLE 3. RUBBER CONSUMED IN THE RUBBER INDUSTRIES. 1935, 1933, AND 1929

	Industry			
	Total	Rubber Tires Inner Tubes	Rubber Boots and Shoes	Rubber Goods Other Than Tires, Inner Tubes, and Boots and Shoes
Crude rubber:				
1935:				
Long tons..	467,008	378,453	20,074	68,481
Cost	$117,559,422	$94,318,413	$5,320,107	$17,920,902
1933:				
Long tons ..	393,871*	315,718	17,994	60,159*
Cost	$44,749,520*	$34,913,896	$2,237,959	$7,597,665*
1929:				
Long tons ..	462,101	400,364	18,938	42,799
Cost	$209,458,746	$180,592,960	$8,907,713	$19,958,073

(*Continued on page* 49)

Latex and Its Uses[1]

W. J. R. Hauser[2]

EXPERIMENTS with latex are not new. Records show that 200 years ago uses of latex were observed in Brazil by such explorers as Condamine and Fresnau. One of these explorers sent to the then King of Portugal a coat rubberized with latex, which he had obtained from the natives. This coat was presumably the first raincoat imported into Europe. How it was cured or whether it was cured, is not definitely known. It is said and supposed that some of the natives used gun powder mixed with the latex and then vulcanized it, so to speak, by exposing it to the heat of the sun. Up to 2% combined sulphur has been found in such specimens.

Many years later, around 1820, Thomas Hancock made some experiments with latex, and unsuccessful attempts were made to transport it without the addition of a stabilizing agent. The art of stabilizing latex was unknown at that time. About 1850 it became known that alkalies like ammonia would preserve latex, and soon after this date, Hancock's brother, Charles, and his friend, Silver, obtained patents covering a number of uses of latex.

Nothing further of importance developed until around 1900, when a French physician, Dr. L. Morisse, who, while in Brazil, saw how the natives were handling latex and conceived the idea that this method was the means of making rubber goods, rather than from Para. Morisse returned to Paris where he and his co-worker, Dr. V. Henrie, the well-known physico-chemist delivered lectures in which they described how to make rubber gloves and other dipped articles from latex, how to saturate fabric with latex, and how to coagulate latex in different ways.

Then around 1926 the evaporation, creaming, and centrifuging processes were put to commercial use for concentrating latex in order to reduce freight costs. It was soon proved that the concentrated latex per pound solids was more expensive than ordinary normal latex.

Latex imports into the United States increased rapidly from 1927 to 1936, despite the depression, as is shown below:

Year	Tons	Year	Tons
1927	1,116	1932	5,084
1928	4,167	1933	11,085
1929	3,728	1934	13,070
1930	4,449	1935	13,553
1931	4,649	1936	19,875

New uses for latex are constantly being discovered, and it cannot be doubted that future years will see latex used for many new purposes. Latex has replaced quite a number of other materials such as starch, paste, glue, and solvent rubber solutions used for adhesives.

Originally some people thought that latex would replace crude rubber, and some optimists even thought that rubber mills and other such heavy crude rubber implements would be discarded within a number of years. No such radical changes have occurred. Latex cannot be masticated or mechanically plasticized. Since the usual reenforcing agents do not act as such with latex, the abrasive qualities of latex compounds are inferior to those of compounds from which tires are now made.

Many new uses for latex have been found, however, which could hardly be served by ordinary rubber. Also, to some extent latex can be termed the crude rubber for the poor man, for latex as a rule does not require expensive and heavy machinery.

I will now discuss some of the various uses to which latex is being put today, and you will note that some of the uses mentioned are outside the ordinary field of rubber manufacturing.

Latex lends itself admirably to the dipping process, and it has practically replaced the former naphtha-rubber solution for such articles as rubber gloves, bathing caps, balloons, and small articles which can be dipped in large multiple units. Latex articles have been found to have greater tensile strength and superior aging qualities.

Small Thin Walled Articles

Forms, usually made from glass, are attached to large racks and dipped into a tank containing the latex compound with vulcanizing agents, withdrawn, dried, and, if necessary to give the desired thickness, the cycle is repeated. The racks are next passed through a vulcanizer. Removal of the articles can be facilitated by dipping the forms into hot water containing some soap; then the articles can easily be stripped off, allowed to dry, and thrown into a dusting tumbler. This operation is simple and suitable for small production. Actually, however, in the United States today practically the entire production of thin walled articles is by means of highly developed automatic machines, and in some instances as many as 1,000 gross can be produced in 24 hours with only two or three operators per machine without the article being touched by hands until the packing operation.

Surgeons' Gloves, Bathing Caps, Etc.

With household and surgeons' gloves, balloons, bathing caps, baby pants, etc., the methods are somewhat different. The deposited film, unless very carefully manipulated, would not be uniform, the tips would be thicker and tops thinner, or vice versa, and it would take very long to obtain the required thickness by straight dipping. Therefore a material which will coagulate or which will dehydrate the latex is deposited on the form, and this will, when the form is placed into the latex compound, cause a rapid and even deposition over the entire form, the thickness depending on the length of time the form is left immersed in the latex bath. Thus in one operation can be achieved what otherwise might require several dips. After the form is withdrawn, it is dried and vulcanized in the usual way by heat.

Lightweight All-Rubber Shoes

Quite a number of latex-made lightweight rubber shoes are being produced today by a method essentially the same

[1] Based on a paper read before the Rubber Section, Toronto Chemical Association, Toronto, Ont., Canada, Apr. 30, 1937.

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as described above. The form, usually made from aluminum or which may be of hard rubber with the design on it, is dipped into a latex compound of the desired color. As a rule, a second coat is applied and then a lighter, usually flesh-colored coat is applied as a lining. The shoe is then stripped from the form, turned inside out, put on to a last, and the calender-stock sole and heel applied. Then the entire shoe is vulcanized in the usual way and finally lacquered. Some manufacturers use a patented process, by which the form is first dipped into latex, then into a liquid coagulant, and redipped into latex.

Another way of making rubber shoes is to dip flat forms into the latex composition. These flat pieces of rubber are then stretched over a shoe last and finished off as usual.

A third method of making rubber shoes by molding will be described under "Molded Goods."

Balloons

Toy balloons, advertising balloons, and meteorological balloons are today being manufactured extensively by latex dipping. The methods of production vary, depending on the manufacture, but I think it is safe to say that most of them are produced by means of some dehydrating or coagulating medium, such as described before. Meteorological balloons are also made by molding, to which I will refer later.

In the case of advertising balloons it has been found that dipping on paper molds is quite advantageous, and very often parts of the paper molds are retained in the finished articles, as for example the ears, nose, etc., thus giving them appearances not possible by the regular dipping processes. The molds, of special paper, can easily be replaced and take up very little space, thus permitting a large number of balloons to be dipped at the same time in a comparatively small space.

Another method which also makes use of the principles of dipping should be mentioned here. Heated forms are introduced into a latex compound that previously has beeen heat sensitized, i.e., to which substances have been added, which at a given temperature cause a thickening of the compound on the heated surface of the form.

Canvas Gloves

During the last two or three years there has been an increased demand for a latex-treated canvas glove, in black, white, and occasionally brown. The compound used for producing rubberized canvas gloves necessarily has to be cheap. The method of production is to put the canvas glove on to a wooden form, shaped like a hand, the thumb of which can be removed from the form so as to permit easy removal of the glove from the form. The latter, with the glove on it, is dipped into the latex compound, withdrawn, allowed to dry, and then redipped; if necessary a finishing varnish or lacquer is applied and the glove is vulcanized at fairly low temperatures. It has been found that latex treated canvas gloves give excellent results; therefore they are replacing rapidly the other types of canvas gloves.

Rubber Threads

In the 1920's patents began to appear for the production of rubber thread made by a continuous process from latex, but it is only in the last few years that this product has reached a commercial stage and now is being made by several methods. A round thread, which has many advantages over the old calendered and cut thread, is formed by extruding the latex through a nozzle into a coagulant as a continuous process. It is possible to produce threads of this character of much smaller diameter than by the old method. The product known as "Lastex" is produced this way.

Another process starts with a narrow, thin rubber band deposited from latex on a moving belt, and the band is wound helically to a thread. Another type of thread being produced commercially is formed by deposition on a drum. The "Controlastic" process covers a strand of twisted fiber with an outer latex film, thus producing a rubber tubing with a fibrous core.

The development of these new types of thread has greatly increased the use of elastic woven materials in the last few years.

Molded Goods

There are various types of molding processes, ranging from fairly simple methods using plaster of Paris molds, to more positive methods, such as the Kaysam process. A suitable latex compound can be poured into a plaster of Paris mold; and after the compound has stood for a certain length of time, the surplus is poured out, and the mold is then placed into an oven and the deposited latex dried, and vulcanized. After the mold has been opened, the rubber article will be finished, except for trimming off.

Latex is also used to produce a rubber mold itself, by applying a latex compound of suitable composition to the surface of the original model, and the desired thickness is built up gradually coat by coat. Finally, the original model with the rubber coating is vulcanized, whereupon the rubber coating is stripped off and the rubber mold is ready for use.

The Kaysam process is a method of casting rubber goods which has been in commercial use in Europe for some time and which is gaining a foothold in North America. With this type of molding process balloons, toys, shoes, boots, and other hollow or solid articles can be produced in any desired thickness, without porosity. The molds used are non-porous metallic forms. The desired latex compound is prepared, and a sensitizing agent, which causes it to congeal at a given time, is added, whereupon the liquid compound is poured into an aluminum mold of the desired shape. The mold is then usually submerged into hot water, which will cause the sensitizing agent to react and the latex to set to a gelled mass, which is then removed from the mold, washed, and dried. It is claimed with this process that the shrinkage is uniform.

When producing hollow, seamless articles, like balloons, a two-piece mold is used and a desired quantity of the sensitized compound is placed into one half of the mold after which the mold is assembled and then rotated at a low speed in hot water or steam. The latex is evenly distributed on the inner surface where it gels layer upon layer as the mold rotates. The mold is then opened, and the article withdrawn for vulcanization. Centrifugal action is not required.

Meteorological balloons are made with this process, and balloons from a few inches in diameter to many feet in diameter are thus produced. These balloons must meet government specifications as to weight, thickness, etc., and it has been found that by this process these requirements can be fulfilled.

Articles as rubber pails for acids and blocks for making hats are also made by this process, and it has been found that the latex block is very tough and stands up under hard usage.

If an article, e.g., a shoe, is to be made, a mold with a core is used, the liquid compound filling out the spaces between core and shell.

Combining Fabrics

Latex has replaced the naphtha-rubber cement to a certain extent for combining fabrics. Usually a fairly viscous, highly loaded latex compound or latex dough is applied, by means of a regular spreading knife, to one of the fabrics, and about one yard behind the spreading knife the other fabric is brought down on to the wet latex surface. The two are then pressed together through rolls. These combining compounds can either contain vulcanizing ingredients or not. Fabrics combined in this this way are used extensively in the shoe trade. Some types of fabric cannot be latex treated as they will show excessive shrinkage when wet, and since latex contains water, this shrinkage cannot be avoided.

Latex Coated Fabrics

It might be expected that latex compounds could ideally be spread on to fabrics for many of the common uses of so-called coated fabrics. However this application has been limited largely by the shrinking effect of moisture on the particularly delicate type of fabrics generally used and by the fact that even slight shrinkage or other effects from the water would spoil the fabric for the particular use for which it is intended. Water dropped on to an unlacquered latex-spread surface has a tendency to produce white spots which are naturally objectionable from a sales point of view. In spite of the saving in cost because of less coats in the case of latex these disadvantages have not yet been overcome.

Latex in Leather

Recent developments have enabled combinations of latex with certain other materials to produce remarkable new artificial leather finishes or top coatings on real leather and on naphtha-rubber coated fabrics, all of which can be readily embossed and lacquered. The lacquers will adhere much better to some compound latex surfaces than to regular rubber.

These artificial leather finishes have a considerable outlet as sock linings as well as for top leather in the shoe trade. Also there is a sizable field for cheap artificial leather on a paper or fabric base in the manufacture of hand bags, novelties, ladies' belts, etc. Various colors including the lightest pastel shades can be produced, as desired.

These artificial leather compounds made with latex are applied to the fabric or paper base by means of a regular spreading machine or in some instances by spraying. The speed of the machine would have to be reduced or the drying portion lengthened to allow for the slower evaporation of water than naphtha. However the fire hazard of naphtha is eliminated in the case of latex compounds.

General practice is to apply one or two coats of latex compound and then a coat of clear lacquer, after which operation the material is embossed either on a calender or by using flat embossing plates.

Automobile Plush

Latex backed material is used almost exclusively by large American manufacturers. Whereas formerly upholstery pile fabrics were made with the W-type weave in order to keep the pile in place, the more simple V-type weave leaves a greater portion of the pile showing on the face and permits faster operation of looms. The V-type weave, however, requires a cement to hold the pile in place, and latex adhesives are most suitable. Latex compounds are generally of about 40% total solids and contain exceptionally large amounts of antioxidants (2 to 3%), vulcanizing agents, and ultra-accelerators so as to effect a cure during the drying or shortly after that operation.

This compound is applied by spreading to the woven pile fabric before it is scoured or dyed. The fairly fluid compound flows between two knives on to the back of the fabric and overflows over the selvages. The machine speed (quite high, usually 12 to 20 yards per minute) must be maintained to prevent penetration of the latex through the fabric on to the pile face. The spreading device is usually mounted in front of a pin tender frame enclosed in a suitable drier in which the air temperatures, with proper circulation, are generally between 250 and 280° F. so as to dry thoroughly and at least partly vulcanize the coating. Coated fabric should stand for two or three hours at least before it is scoured and dyed. Such commercial pile fabrics today show little or no deterioration of the backing after 120 hours in the oxygen bomb and also stand up under severe fadeometer tests.

Backing and Sizing of Carpets

Latex is used on the backs of carpets and similar floor coverings to make them non-slipping, to provide a sizing or binder for reenforcing the construction, and to prevent the fiber from dusting out in loosely or cheaply woven materials. Latex compounds vary with the type of fabric and the objects to be accomplished, but generally contain some filler and the usual vulcanizing agent with ultra-accelerators. The continuous application is by wiper roll or spreading knife from which the carpet passes through the usual type of carpet drier during a period of about one-half hour at temperatures of 240 to 280° F., thus effecting complete drying and vulcanization.

Automobile carpets will not unravel and require no binding at the edges of the holes cut for pedals, etc. Latex backed carpets lie flat and do not curl up as with the ordinary starch sizing. Latex compounds are also made for home application to scatter rugs to prevent slipping on polished floors. Latex backing on felt carpets or jute fabrics used as rug underlays holds in the loose fiber and makes the underlay non-skidding.

Latex Adhesives

Latex is an excellent natural flexible adhesive and, therefore, it is not surprising that today it is being used so extensively for this purpose, not only in the shoe trade, but also for numerous other purposes. It is also used as an adhesive for bookbinding, tabbing, and various other processes where formerly glue and paste were utilized. As soon as two rubberized surfaces are brought together, they stick; whereas with glue or paste it is necessary to allow them to dry and set before they actually combine. The permanent flexible bond cannot be equalled by other materials. Modifications are made in viscosity or tack to meet individual requirements.

Battery Separators

Quite some years ago a process was developed abroad to make microporous rubber. This process is generally known as the Beckman process, after the name of the original inventor. The principle of this process consists of a controlled coagulation of the latex compound so that a coagulum is obtained which retains most of the original water of the compound in its interstices. This is vulcanized under water to prevent collapse of the microstructure before the rubber has been sufficiently vulcanized. Today two companies are producing such microporous battery separators on a large scale.

Can Sealing

Latex compounds are being used extensively for can sealing purposes. The latex compound is applied by special machinery to the grooves in the caps of the cans, and it is claimed that with a latex compound better and more economical results can be obtained than when using other methods. The high solid content of the latex compound as compared with the previously used gasoline cements guarantees a perfect filling of the lining so that a hermetic seal is formed when the can end is clamped on to the can body.

Paper Saturation

A soft absorbent paper, loosely felted, having low wet strength, and generally made from specially treated sulphite or alpha pulp, is passed through a saturating bath containing the latex compound, which is generally of about 15 to 20% solids. The wet, very weak web is then supported on a wire, table rolls, or like support and carried into a drier and eventually over drying cans which serve to iron out any distortion. Usually the latex does not contain vulcanizing agents as vulcanization is not considered necessary for this type of product.

Depending on the amount of saturation and the type of compound used, the finished product has remarkable tear strength and leather-like feel. A great part of these products is used for innersoles for women's shoes and also for sock linings a swell as a base for artificial leather and novelty articles. The innersoles require no further finishing. Sock linings and imitation leather articles are generally finished with a lacquer or pyroxylin and embossed.

Most plants in the United States which are carrying out this work have specially designed machines for continuous 24-hour daily production at speeds of from five to 10 yards per minute.

Latex board, made by an entirely different process, has increased greatly in production the last year or two, the product being principally used in automobile body construction as well as in the shoe trade. One method forms the board with the usual board mill machinery in a fairly light gage and then laminates three of these boards together in one operation by the use of latex as a binder. The other method is to deposit the latex on the fiber in the heater or in the stuff chest and then to form the board on the usual wet machine. Such boards usually contain from 15 to 30% of rubber based on the dry weight of the fiber.

Sponge

After many unsuccessful attempts two or three processes have been developed to produce sponge rubber from latex on a commercial basis. One of them is the Dunlop process, which today is producing considerable quantities of latex sponge for the automobile cushion trade. The principle of this process consists of adding frothing agents to a heat sensitized latex compound, beating the compound to a froth, and pouring the froth into appropriate molds, which are then immersed into hot water, thereby gelling the compound and vulcanizing *in situ*.

Another process which is not exactly a sponge rubber, but which comes under the same classification, is the so-called "Hairlock" process, that is, a method of rubberizing curled animal hair to produce sponge-like cushions which are also used in the manufacture of seats, mattresses, etc. The hair, usually horsetail or oxtail, is sprayed, or otherwise covered with latex and then put into forms of appropriate shapes and vulcanized.

There are various other processes on the market which are, more or less, still in an experimental stage.

Miscellaneous

Besides the individual processes mentioned before, latex is also used for numerous other purposes. A latex compound is used as a filler in road joints to permit ready expansion and contraction so as to eliminate cracking of the road. The advantage of a latex compound of this description over the usual road filling material is that the rubber will expand and contract and, therefore, will not be likely to open up like other road joints. There are variout types and processes for making road joints on the market, and undoubtedly this type of usage will increase as time goes on.

Latex is also being used to some extent in the cosmetic trade in the manufacture of rolling creams and face creams; also in motion picture studios for certain types of cosmetic work, as a base for makeup, etc.

Tree surgery, the grafting of trees, etc., is also aided by the use of latex.

A decidedly interesting and new use for rubber has been made possible by the extent to which latex can be purified and the non-rubbber constituents removed, for instance, by repeatedly centrifuging it. Normal latex passed through the type of centifuge usually employed for concentrating, say three times, with appropriate dilution of the concentrate between each pass and coagulated by means of heat or non-acid materials, produces a plastic rubber having a nitrogen content as low as 0.12%. Centrifuging four or even five times produces a correspondingly even purer rubber, and this deproteinized rubber is quite useful for insulating underwater cables. Latex centrifuged three or four times is still sufficiently stable to keep well for reasonable periods and can be employed as latex. Generally, however, after this treatment it is coagulated into rubber, given a further washing treatment, dried, preferably under vacuum, and then employed in a standard cable compound.

Originally started in Europe, the use of latex in the manufacture of envelopes has also gained a foothold in the United States during the last few years. It is being utilized on so-called "self-sealing" envelopes. The principle is the fact that two uncured pieces of rubber will cohere when brought in contact with each other. Specially prepared latices are used and applied to the envelopes by machines which either roll or print the latex on to the portions of the envelope to be brought together.

It has been found that the addition of latex to various types of greases will change the viscosity of the grease, and it seems that primarily for this reason it is being used in conjunction with various lubricating greases.

Also, in the manufacture of printing blankets latex is being used for saturating the fabric. It is claimed that the latex impregnated cover does not peel off or blister and has certain advantages over an ordinary rubber covered blanket.

Estimated World Tire Exports

Estimated exports of automobile casings from principal countries declined 4% in 1936 as compared with the preceding year, from 4,495,000 to 4,321,000. One of the reasons for the lower 1936 figures is the absence of any statistics for Italian tire exports since September, 1935, when Italy suspended publication of official export returns. Omitting Italy from the calculation, world tire exports in 1936 would show an increase of 3.6% in 1936 over 1935. *Commerce Reports.*

Rubber Mountings for Large Industrial Machines—II[1]

Vibrograph Records of Two Heavy Machines Show the Effectiveness of Rubber Mountings in Isolating Vibrations. Factors of Design and Characteristics of Rubber Shear Mountings for Machinery Are Also Considered

Stuart H. Hahn[2]

IN EVERY case where a direct comparison has been possible, the effectiveness of rubber mountings in reducing the transmission of vibration from machinery installed in the plants of The B. F. Goodrich Co. has been striking. Several of these installations were illustrated and described in Part I of this article.[3] No delicate instruments are required to make such comparisons; one's sense of hearing and touch reveal the marked contrast between mounted and unmounted machinery of the same type. However as a means of recording and measuring the effectiveness of the mountings, a number of vibrograph records have been made from time to time; Figures 8 and 9 show typical records.

The floor and foundation vibration records were made either by a single-element, inertia-type instrument having a magnification ratio of about 27-1 or by a Shrader tridimensional vibrograph having a magnification ratio of about 125:1. The single-element instrument was designed and built in this laboratory. The Shrader instrument employs a photographic system for recording three mutually perpendicular components of the relative motion between the frame of the instrument and an inertia mass supported by helical coil springs.

Figure 8 shows a comparison between the floor vibrations set up by two similar Gordon plasticators as measured with a single-element vibrograph at four stations adjacent to each of the two machines shown in Figure 9. Machine No. 2 is that supported by flat plate shear mountings, the other machine being bolted and grouted to the floor. The two machines are in adjacent bays of the sixth floor of an eight-story, heavily constructed reenforced concrete building having 12-inch floors. During the test of each machine the other was shut down, other machinery in remote parts of the building producing no more than a barely measurable amplitude of vibration.

The reduction in amplitude of vibration shown by these records is of the order of 75 to 90%. Note particularly the reduction of higher frequency vibrations. The vibration set up by the unmounted machine, in one region near the wall of the building, is severe enough to cause a very distinct relative movement between the floor slab and the wall although the wall be supported between building columns by the slab.

Figure 10 shows a similar set of records taken near the 20-inch Gordon plasticator. Records were made at each of the several stations with the tri-dimensional vibrograph while the machine was being operated in the normal manner on its mountings and again while it was connected rigidly to the floor.

The earliest use of rubber as a spring device was undoubtedly some unrecorded application of bands or cords of native unvulcanized rubber in tension. Probably the earliest well-known record of the use of rubber as a mechanical cushioning device was its use in compression for railway buffers.[4] Since the beginning of the rubber industry rubber pads, blocks, and special molded forms stressed in compression have supported vibrating loads or have cushioned machines and vehicular bodies from external shock and noise. It has been only within comparatively recent years that the scientific approach to vibration problems has eliminated the older cut-and-try methods of designating rubber parts used for such purposes.

Many technical reasons have influenced the present trend toward the almost exclusive use of shear-type rubber mountings in preference to all other types. The principal reason is that rubber is much more readily deformed in shear than it is in compression or tension as

[1] Reprinted from *Product Engineering*, Mar., 1937, pp. 96-99.
[2] Physical Research Laboratory, B. F. Goodrich Co., Akron, O.
[3] India Rubber World, Apr. 1, 1937, pp. 49-52.
[4] See serial reprint of 1855 edition of "Gum Elastic" by Chas. Goodyear in *India-Rubber J. (London)* 91, p. 433, et seq. (First installment Apr., 1936.)

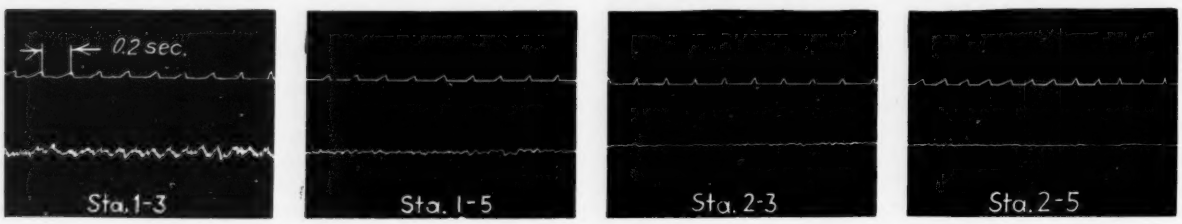


Fig. 8. Vibrograph Records Showing Typical Vibration near 15-Inch Plasticators; Stations 1-3 and 1-5 Are for No. 1 Machine Which Has No Rubber Mountings, and Stations 2-3 and 2-5 Are for No. 2 Machine Supported by Sandwich-Type Rubber Shear Mountings

may be seen from Figure 11.[5] The most compact form of the shear-type mounting is the tubular type, especially that used in mounting the machines previously mentioned and shown in Figure 12. This type has many practical advantages, the chief of which are:

1. The ability to carry relatively high shear stresses at the rubber-metal interface of its smaller inner metal member.
2. Adaptability to a housing structure which tends to reduce the danger of oil contamination of the rubber.
3. The simplicity and low cost of the metal parts.
4. The ease with which an adjustment can be made.

Special or combination types of shear mountings have been made to fit particular products. In many of these

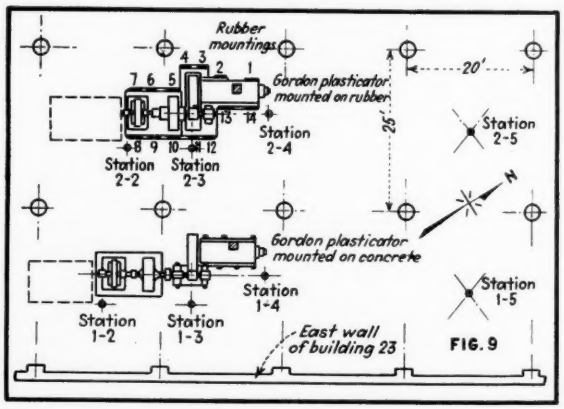


Fig. 9. Plan Showing Location of Vibrograph Stations and Position of Plasticators

the weight of the supported machine is carried by compressive or tensile stresses in the rubber while its elasticity in shear is used to secure the desired cushioning of vibration.

A brief review of certain of the characteristics of rubber as an engineering material may clarify some of the problems which arise in conjunction with its use as an elastic support for industrial machinery. Soft rubber is differentiated from the more usual materials of construction chiefly by the comparatively large deformations to which it may be subjected within its elastic range.

Rubber has no clearly defined elastic limit. Its breaking strength in tension based on the initial cross sectional area ranges from about 1,000 to about 5,000 pounds per square inch. High-grade compositions suitable for mounting service show a breaking strength of about 3,500 pounds per square inch at an elongation of from 500 to 900%, depending on the hardness of the compound. The tensile load-deflection relation and the shape of the load-deflection curve depend to a great extent on the composition of the rubber. For relatively high gum compounds it is roughly S-shaped.

Upon being allowed to recover from its deformed shape, a piece of rubber will return nearly but not quite all of the energy delivered to it during the initial deformation. This energy loss in each cycle of deformation, which results from hysteresis or internal friction, varies over a wide range, depending again on the composition of the rubber. For the types of rubber developed for mounting service this loss is relatively small and the temperature rise resulting from the normal vibratory movements of the mounting will not be perceptible.

The small hysteresis effect inherent in rubber mountings is of value in serving to damp out extreme vibratory movements in the range of resonance through which every elastically mounted machine must pass when starting or stopping, although it does increase the transmission of vibration in the normal range of operating speeds by a small amount. Rubber is superior to other organic materials in having small hysteresis and it is inferior in this respect only to steel among the common elastic supporting media.[6] It is well known, however, that auxiliary damping means are usually required to permit safe operation of steel spring mountings.

Coupled with hysteresis are the related effects of creep and permanent set. The deformation of rubber under constant load will change slowly with time at a rate depending on temperature, type of compound and its state of vulcanization, and on the degree and duration of stress.

A graph, Figure 13, shows the average deflection versus time relation for the tubular shear-type mountings which support a pair of 60-inch rubber warming mills and their drives. The time scale is shown on a logarithmic basis because the creep rate decreases with extreme rapidity during the early portion of the time after application of load to the mountings. The nearly linear relation between deflection and the logarithm of time holds for about 100 days after application of load. After the first 100 days, the relation has been, up to the time this paper was prepared, nearly linear with time in every case which the

[5] "Isolating Vibration with Rubber," F. L. Haushalter, *Product Engineering*, Dec., 1931, pp. 542-45.
[6] "Influence of Damping in the Elastic Mounting of Vibrating Machines," E. H. Hull, Trans. A.S.M.E. APM-53-12, 155-165 (1931).

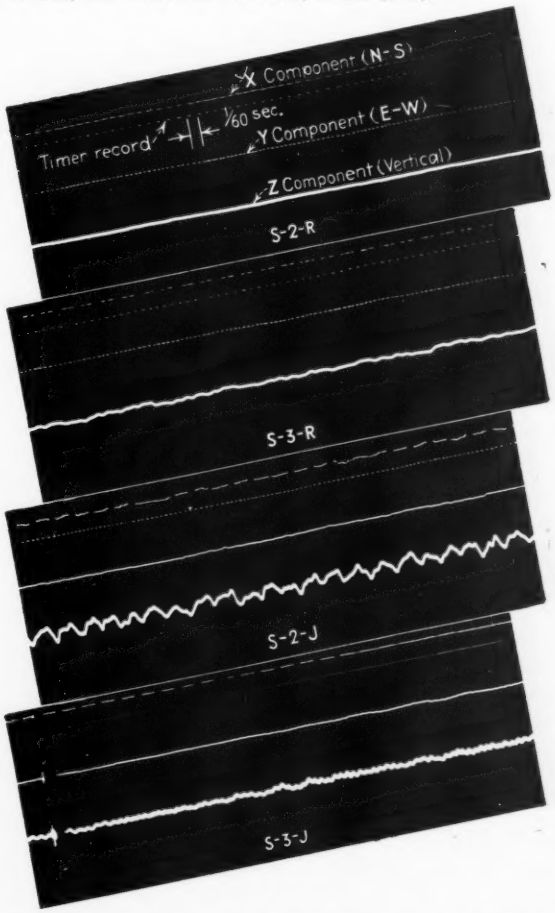


Fig. 10. Floor Vibrations near 20-Inch Plasticator with and without Rubber Mountings; Vibrograph Station Positions Similar to No. 2 and 3 Shown in Fig. 9, Vibration Shown in S3R Record Exceeds That Shown in S2R Because of Change in Operation of Heavy Machinery on Ground Floor

author has studied. This condition results in an upward turn of the latter portion of the logarithmic graph. If this portion were plotted on a linear time scale, it would be nearly a straight line showing an increase in deflection of about 7½% of the initial deflection per year.

A part of the deformation of rubber which results from creep is recoverable, and a part of it lost. The recovery of form after complete removal of load follows somewhat the same time relation as does creep under load. The "permanent set" of rubber body is a measure of its permanent change from its initial form and is usually measured at a specified time after removal of a given load from a standard test piece which has been held at a controlled temperature. Permanent set varies over a large range for different rubber compounds.

The irregularities shown in the above creep curve are caused chiefly by a temperature effect which is more or less peculiar to rubber. The deflection of rubber under constant load usually decreases with increase in temperature. Thus a rubber band supporting a moderate load will shorten as its temperature is raised. The degree of the effect depends principally on the stress in the rubber and type of compound employed.

The properties of rubber are varied by proper selection and incorportion of reenforcing, loading, or softening

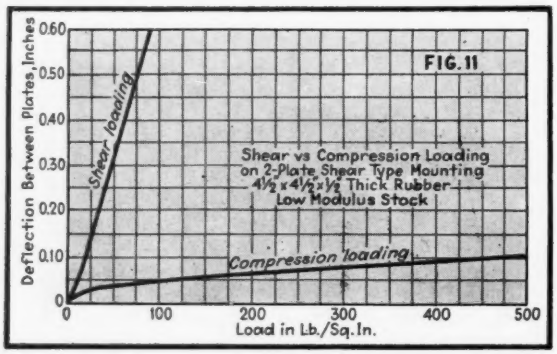


Fig. 11. Shear versus Compression Loading of Rubber

pigments, and by vulcanizing agents together with the choice and treatment of the crude rubber. The properties depend also on the proper control of vulcanizing conditions and their degree of permanence is related to the conditions of service and use of small quantities of certain auxiliary materials such as the age resisters. The interrelation between the various properties is such that specifications of the characteristics of a compound will usually be limited by the choice of a desired principal property. For instance, it is usually difficult to secure very low hysteresis in relatively hard or stiff rubber compounds.

A series of standard shear mountings, as shown in Figure 14, has been made available to the trade for general purpose uses. These cover a fairly wide range of load and deflection capacities.

The Design of Rubber-Mounted Assemblies

The application of elastic mountings of any type to a machine will be facilitated by careful study of a few fundamental design factors. In other words the complete assembly must be more than a simple combination of a suitable number of rubber mountings, properly designed and located, and a normal machine designed to be mounted rigidly.

In most installations the primary requirement is that of having the base or frame stiff enough to maintain proper alinement of all parts relative to each other. Any contribution to such rigidity offered by the foundation or floor on which the rubber mountings rest is not considered. The most economical design for rubber mountings will usually be one which has been worked out expressly for that purpose.

However, as with the rubber machinery units which have been described, it is often possible to work out an economical welded steel sub-base. The mill and plasticator units probably required heavier sub-bases than those necessary for most types of machinery. Many other machines will need no special sub-base or reenforcement because of the relatively light dynamic loads imposed or because it may be relatively unimportant to maintain exact alinement between the several parts of the machine.

It is always desirable, in the interests of economical design and machine stability, to avoid the presence of extremely low disturbing frequencies in the rubber-mounted machine, that is, frequencies lower than about 10 or 12 cycles per second. It should be recalled that the lowest disturbing frequency which is to be isolated should be at least four times the fundamental or resonant frequency of the elastically supported machine.[7]

In the usual case in which the stiffness of the springs has a constant value the resonant frequency is inversely proportional to the square root of the static deflection of the elastic support, that is expressing static deflection as d in inch and resonant frequency as fr in cycles per second.

$$fr = \frac{3.13}{\sqrt{d}}$$

The error in fr resulting from the assumption of a linear modulus for shear mountings in this equation will be less than 10%; that is, fr (calculated) will be more than the actual value by not more than 10%. For very effective isolation of a disturbing frequency the ratio of impressed to resonant frequencies should be eight or more, although

[7] S. Timoshenko, "Vibration Problems in Engineering," (Van Nostrand) or any standard text on vibration problems.

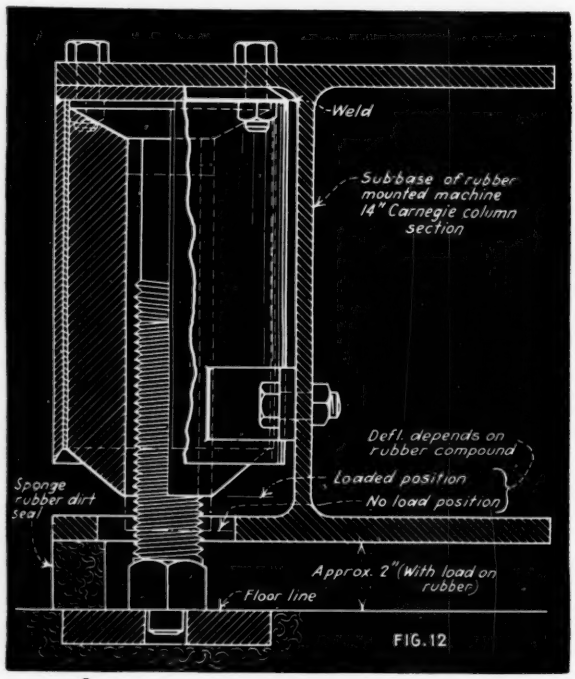


Fig. 12. Cross-Section of Tubular Shear Unit

for rubber mountings the transmissibility for a ratio of four is only about 0.075 and further increase in the ratio results in only a very gradual decrease in transmissibility. In other words, a rubber mounting will transmit only about 7½% of an impressed vibratory force having a frequency four times the resonant frequency.

One of the primary advantages of rubber as an elastic support is its relatively low transmissibility of sound, a

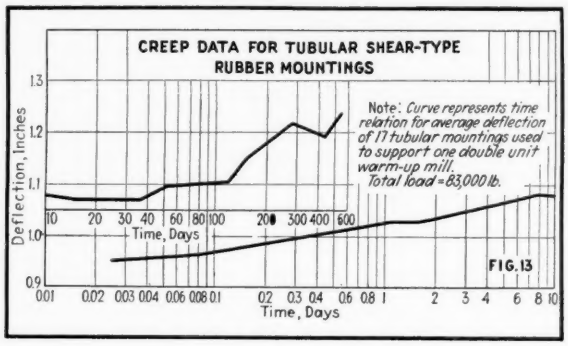

CREEP DATA FOR TUBULAR SHEAR-TYPE RUBBER MOUNTINGS
Note: Curve represents time relation for average deflection of 17 tubular mountings used to support one double unit warm-up mill. Total load = 83,000 lb.
Deflection, Inches
1.3
1.2
1.1
1.0
0.9
10 20 30 40 60 80 100 200 300 400 600
Time, Days
FIG. 13
0.001 0.002 0.003 0.004 0.006 0.008 0.01 0.02 0.03 0.04 0.06 0.08 1 2 3 4 6 8 10
Time, Days

Fig. 13. Creep Data for Tubular Shear-Type Rubber Mountings

benefit which can be lost by the careless direct connection of a fairly rigid pipe line or conduit to a rubber-mounted machine. In fact, the noise nuisance created by such a connection is likely to exceed that produced by a similar solid connection to a rigidly mounted machine. A unitary arrangement of the power source on the same base with the driven machine is often possible.

Variable or shifting loads should be avoided if possible, especially on machines carried by very soft mountings. A shift in the center of gravity of the machine will cause it to tilt and produce non-uniform loading of the various mountings in the group. An increasingly more severe off-level condition will then result because of creep variations among the various mountings.

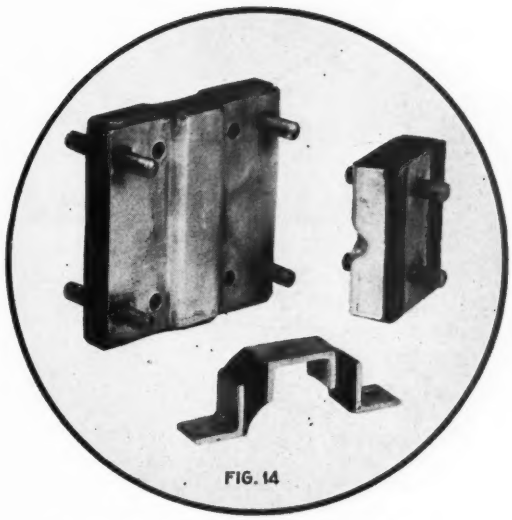


Fig. 14. Types of Standard Rubber Mountings

Often it is best, in the interests of stability and reduction of excessive rocking movements to a rubber-mounted machine, to avoid placing the mountings too low in relation to the center of gravity. The ideal arrangement calls for the location of the elastic support at or near the center of gravity of the complete assembly. Since such an arrangement is seldom practical, the most satisfactory solution with multiple mountings will be to raise the horizontal plane of the mountings as far as seems advisable. An improvement in dynamic conditions will be obtained in a few cases by lowering the horizontal plane of the mountings so as to give the machine a higher polar moment of inertia, thus removing one or more of its resonant frequencies of rocking from those critical regions determined by the frequencies of the vibratory forces that are to be isolated.

Census of Manufactures

(*Continued from page* 41)

TABLE 3. RUBBER CONSUMED IN THE RUBBER INDUSTRIES, 1935, 1933, AND 1929 (*Cont'd*)

	Industry			
	Total	Rubber Tires Inner Tubes	Rubber Boots and Shoes	Rubber Goods Other Than Tires, Inner Tubes, and Boots and Shoes
Reclaimed rubber: Purchased and consumed:				
1935:				
Long tons ..	76,219	26,317	1,482	48,420
Cost	$8,000,575	$2,701,884	$160,720	$5,137,971
1933:				
Long tons ..	81,936*	40,203	1,252	40,481*
Cost	$6,421,753*	$3,143,675	$117,960	$3,160,118*
1929:				
Long tons ..	206,091	115,855	10,019	80,217
Cost	$26,864,425	$16,639,046	$1,350,141	$8,875,238
Made and consumed:				
1935:				
Long tons ..	37,404	30,483	†	6,921†

* Incomplete on account of use of abridged schedule; see footnote *, Table 2.

† Figure for consumption in "Rubber boots and shoes" industry included with that for "Rubber goods other than tires, inner tubes, and boots and shoes" to avoid disclosing approximations of data reported by individual establishments.

TABLE 4. RUBBER CONSUMED IN THE RUBBER INDUSTRIES, BY STATES, 1935

	Crude Rubber		Reclaimed Rubber: Purchased and Consumed		Reclaimed Rubber: Reclaimed and Consumed
	Long Tons	Cost	Long Tons	Cost	Long Tons
United States...	469,448	$118,227,609	76,221	$8,000,575	37,404
California	35,988	8,318,156	4,353	351,055	1,911
Connecticut	12,566	3,240,994	1,081	135,374	....
Illinois	5,239	1,356,568	5,770	561,142	*
Massachusetts	34,167	8,899,552	6,500	627,481	3,148
Missouri	2,252	568,521	2,834	342,326	....
New Jersey	14,008	3,686,349	6,724	879,426	1,233
New York	7,695	2,004,800	1,093	169,285	*
Ohio	249,821	60,173,464	23,353	2,197,985	26,988
Pennsylvania	12,471	3,405,968	2,036	213,227	....
Rhode Island	5,099	1,398,398	679	69,413	....
Indiana, Kentucky, Michigan	13,454	3,863,817	2,435	275,814	....
Minnesota, Wisconsin	60,953	17,276,517	15,481	1,710,004	*
Other States† ...	15,735	4,034,505	3,882	468,043	4,124

*Figures withheld to avoid disclosing, exactly or approximately, data reported by individual establishments; included in figure for "Other States."

†Alabama, Colorado, Delaware, Georgia, Iowa, Maine, Maryland, Nebraska, North Carolina, Oregon, Texas, Virginia, and Washington. Figures combined to avoid disclosing, exactly or approximately, data reported by individual establishments.

Physical Testing Procedure for Latex Stocks[1]

L. A. Wohler[2]

ALTHOUGH procedures for the preparation of physical testing slabs from milled rubber stocks have been standardized, no such specifications are available for latex stocks. Test slabs from latex require special treatment and, if certain conditions are not fulfilled, erratic results will be obtained. The term "physical testing" as used here means the elongation modulus and tensile readings usually determined on the Scott testing machine. The procedure herein described is not set up as a complete specification, but it does give a method by which accurate and reproducible results have been obtained in this laboratory. It further calls attention to the fact that a latex stock containing more or less standard compounding ingredients (of which some are water-soluble) may be greatly altered in its physical properties by a variation in the humidity conditions under which it is being tested. All tests in this investigation were made on pure gum stocks, which experience has shown to give the most erratic results. While it is true that test strips made from factory-produced articles may give sufficient information for factory control, it is also considered essential to have available a test method for use in obtaining basic information on accelerator-sulphur ratios and general compounding ingredients.

Two methods have been proposed in the literature. One[3] recommends drying the latex test film on a glass plate placed in an oven at 45° C. The other[4] recommends drying the test films on unglazed tile, the edges of which have been built up with strips of paraffined paper to form a tray for drying the latex mix. In this investigation the glass-plate method was adopted in preference to the porous-tile method in order to eliminate any loss of water-soluble substances originally contained in the latex or added during compounding.

In making a latex mix to be used in forming a test slab, three conditions must be considered: namely, proper viscosity of the mix, uniform fine dispersion of the pigments, and a perfectly smooth surface on the dried slab. The viscosity of the mix must be high enough to prevent settling of the pigments during drying, yet low enough to allow all air bubbles trapped during mixing to rise to the surface in a reasonable length of time before the slabs are poured. The dried surfaces of the slabs must be entirely free from ridges, cracks, or other blemishes.

All compounding ingredients used were made up in the form of water dispersions or solutions before being added to the latex. The zinc oxide and sulphur dispersions were of 40 and 50% concentrations, respectively, and were prepared in a ball mill in which they were ground for 48 hours. The zinc oxide was dispersed in a 2% Saprotin solution and the sulphur was dispersed in a 10% glue solution. The basic test formula was of 50% total solids content as follows:

	Grams
60% centrifuged latex	166
40% zinc oxide dispersion	2.5
50% sulphur	3
Piperidine pentamethylene dithiocarbamate (Pip-Pip)	0.75
10% ammoniacal casein	10
Water	26.25

The test mix was prepared by adding first the casein and then the pigments to the latex. The mix was stirred for ten minutes at 350 r.p.m. with a single-blade mechanical stirrer and then strained through fine jersey knit rayon cloth. The strained mix was placed in a special buret and allowed to stand for 0.5-hour before the slabs were poured. During this time the air bubbles rose to the surface.

The above-mentioned burets were constructed from 71-cm. (28-inch) lengths of 29-mm. (1.125-inch) glass tubing, graduated into 25-cc. divisions and fitted at the bottom with stopper, tube, and screw clamp. The slabs were formed and dried in plate-glass trays having inside dimensions of 175 by 175 by 6 mm. (6.875 by 6.875 by 0.25-inch). These trays were constructed by cementing, with sodium silicate solution, 13-mm. (0.5-inch) wide strips of 6-mm. (0.25-inch) plate glass about the perimeter of 187-mm. (7.375-inch) squares of the same material.

The mix was flowed into these trays by placing the buret tube close to the bottom of the tray and allowing the compounded latex to flow slowly into the cavity. The amount of the mix used was determined by the total solids content of the compound and the desired thickness of the dried slab. With the above mix 75 cc. produced a dried slab of 1.27-mm (0.050-inch) thickness. This was the thickness of all slabs tested in this experimental work. The filled glass trays were placed upon a level surface and allowed to dry overnight at room temperature. The slabs were then removed from the trays and after 48 hours' further drying were cured by hanging individually in an oven at 100° C. If any moisture remained in the slabs after this drying period, it was removed during the air cure which followed. It was found that even with substantial amounts of water remaining in the slab before cure, there was little effect on the physical properties at the optimum cure, provided other conditions to be discussed later were fulfilled.

After the cure, test strips were cut out with a standard A. S. T. M. die 11.1 cm. (4.375 inches) long with a 2.5-cm. construction and tested on the Scott machine.

Experimental

When the first slabs were prepared using the given formula, the upper surface of the dried slabs was found to be covered with a network of fine surface cracks which would invalidate any physical tests made with them. By process of elimination the zinc oxide was found to be the pigment causing the cracked surface. However, when 1%

[1] Presented before the Division of Rubber Chemistry at the ninety-second meeting of the American Chemical Society, Pittsburgh, Pa., Sept. 7 to 11, 1936. Reprinted from *Ind. Eng. Chem. (Anal. Ed.)*, Mar. 15, 1937, pp. 117-18.

[2] Research laboratory, Firestone Tire & Rubber Co., Akron, O.

[3] Du Pont Laboratory Report No. 181, Dec. 4, 1934.

[4] *Vanderbilt News*, Sept.-Oct., 1934.

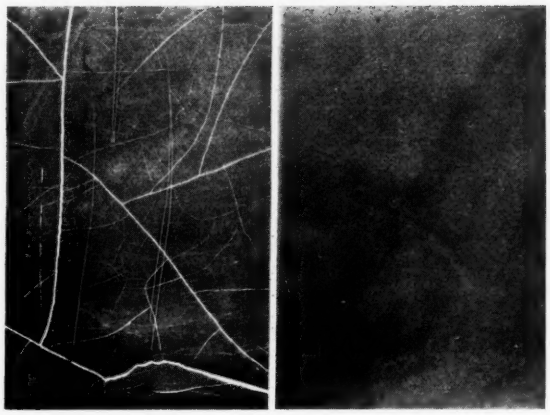


Fig. 1. Two Types of Slab Surfaces

of Aquarex D, on the weight of rubber, was added as additional stabilizer, a slab was formed which when dry had a smooth and flawless surface. Examples of the two types of surfaces are shown in Figure 1.

Several tests using the procedure outlined above for the preparation of a satisfactory slab were made to determine whether reproducible results could be obtained, but it was found that large variations occurred when the test was repeated over several days. The results of a series of this kind are shown in Table I. The slabs for this series were prepared from separate mixes on successive days using identical compounding ingredients. These slabs were also given identical drying and curing treatments. The tensile strength varied up to 25% and the modulus at 600% elongation varied 50%.

TABLE I. RESULTS WITH TEST SLABS

Test	Elongation %	Modulus at 600% Lb./Sq. In.	Modulus at 600% Kg./Sq. Cm.	Tensile Lb./Sq.In.	Tensile Kg./Sq. Cm.
1	910	500	35	4,200	295
2	910	450	32	4,090	288
3	870	750	53	4,530	318
4	900	680	48	4,570	321
5	910	620	44	4,450	313
6	880	950	67	5,360	377

Cure, 45 minutes at 100° C. Four strips pulled on each test.

The well-known water-absorbing properties of latex stocks suggested that the cause of this variation might be changes in humidity which normally occur at room conditions. Therefore tests were run in which the strips were conditioned at controlled humidities until tested. Controlled humidities were maintained in desiccators in which were placed the proper substances to give the desired moisture contents. In the examples reported 50% relative humidity was obtained over a saturated solution of sodium dichromate, while 0% humidity was obtained over calcium chloride.

The test strips, which had been cured, gaged, and benchmarked, were individually hung in a desiccator and conditioned for 48 hours and were removed from the desiccator only as they were pulled. Table II and Figure 2 show the effect of variation in relative humidity from 0 to 50%. The modulus at 800% elongation and the tensile strength were both reduced approximately 30% when the relative humidity was increased from 0 to 50%. Elongation increased slightly with increased relative humidity.

This reduction in tensile and modulus values with an increase in relative humidity showed that consistent results could be obtained only when the humidity was controlled up until the time of testing. Conover and Depew[5] recommend that regular mill-mixed stocks be conditioned at 0% relative humidity before pulling. While these recommendations are not generally followed on mill-mixed stocks, it is most important that constant and preferably 0% relative humidity be maintained when testing latex stocks.

TABLE II. EFFECT OF HUMIDITY ON LATEX STOCK

Cure at 100° C. in Air Min.	Elongation 0% %	Elongation 50% %	Modulus at 800% 0% Lb./Sq. In.	Modulus at 800% 50% Lb./Sq. In.	Modulus at 800% 0% Kg./Sq. Cm.	Modulus at 800% 50% Kg./Sq. Cm.	Tensile 0% Lb./Sq. In.	Tensile 50% Lb./Sq. In.	Tensile 0% Kg./Sq. Cm.	Tensile 50% Kg./Sq. Cm.
15..	900	990	2,820	1,440	198	101	4,010	3,400	282	239
30..	920	930	3,420	2,070	240	146	5,360	3,870	377	272
45..	900	900	3,980	2,490	280	175	5,460	4,100	384	288
60..	870	850	3,900	2,800	274	197	4,980	3,850	350	271
75..	850	870	4,150	2,880	292	202	5,080	4,030	357	283

Three strips tested for each cure. Thoroughly dried strips were conditioned for 48 hours at indicated humidity before testing.

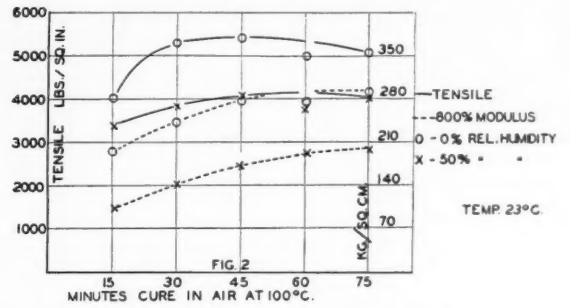


Fig. 2. Effect of Humidity on Latex Stock

In order to determine the reproducibility of results by this method (using 0% humidity) the test was repeated three times, the compounding ingredients being identical in each case. The following formula was used:

Smoked sheets	100
Sulphur	3
Zinc oxide	4
Mercaptobenzothiazole	1

This stock was tested by regular methods. A comparison of the consistency of results from the two types of stocks is shown in Table III. It will be seen that the percentage deviation from batch to batch in the latex stock is favorably comparable to that of the mill-mixed variety.

TABLE III. CONSISTENCY COMPARISON OF LATEX STOCKS *vs.* MILL-MIXED PURE GUM STOCK

Test	Elongation %	Modulus at 800% Lb./Sq. In.	Modulus at 800% Kg./Sq. Cm.	Tensile Lb./Sq. In.	Tensile Kg./Sq. Cm.
		Latex Stock*			
1	870	3,980	280	5,380	378
2	880	3,680	259	5,180	364
3	880	3,860	271	5,140	361
		Mill-Mixed Stock† Modulus at 600%			
1	780	940	66	3,080	217
2	800	810	57	3,060	215
3	800	850	60	3,010	211

*Cure, 45 minutes at 100° C. Four strips pulled on each test. 0% humidity; 23° C.
†Cure, 45 minutes at 127° C. Tested at room conditions, 23° C.

Summary and Conclusion

Adjustment of stabilizers may be necessary in order to produce a smooth surface on an air-dried latex test slab. A combination of 1% of casein and 1% of Aquarex D on the rubber gave a satisfactory dried slab.

Reproducible results cannot be obtained unless the test strips are conditioned at controlled relative humidity conditions. Zero per cent humidity gave highest tensile and modulus figures.

Batch-to-batch accuracy of latex stocks using methods described herein was comparable to that of mill-mixed pure gum stock.

[5] Conover and Depew, *Proc. Am. Soc. Testing Materials*, 27, Part II (1927).

Editorials

Proportion

FOLLOWING every depression there comes a period during which upward readjustment of wages, selling prices, and general conditions is necessary as business improves just as it was essential to adjust downward during the inception of the depressed conditions.

The American spirit of fairness is quite widely embedded in the minds of the general public, but oftentimes the sense of proportion becomes badly distorted by individual leaders for private gain under the disguise of public benefaction.

The great need today is a reasonable consideration of economic principles and an individual realization not influenced by unbalanced judgment, of the great mutual interest of employe, management, stockholder, and consumer, all of whom must pay the cost of such wages and salaries as may be out of proportion to the service rendered.

Every man can be classified into one or more of these four groups, but necessarily he is at least a consumer. As such, he must pay his portion of the additional cost of any existing inefficiency or inconsistency between the money paid out to produce an article and the productive effort provided toward the manufacture of that article.

Each of the four classes is essential to the welfare of the individuals in the other groups, and the benefits from such a business undertaking will be in proportion to the combined recognition of mutual dependence and the honest desire of the individuals to contribute their share of effort toward the objective.

Crude Rubber

A MEETING of the International Rubber Regulation Committee was held on May 25 at which routine business was transacted and no action was taken regarding the exportable quota which now stands at 90% for the last six months of this year. The recent quiet period in market buying may have been prompted by the fact that a meeting of the committee was to be held or by the reported probability of curtailed consumption of crude rubber by some foreign countries, which, if made effective, would release larger quantities for American consumption. Possibly the lull in the discussion of war preparation may have had its effect.

General opinion in the United States appears to indicate that 18¢ per pound would be considered a fair price in New York. This figure is fairly well substantiated by statements in some financial reports for 1936, received from British rubber producing companies, most of which were holders of fairly small estates. These reports indicated that with a gross average selling price of from 7½ 8d. per pound, net profits (after allowing for depreciation) were made during 1936, and in 70% of the reports dividends of from 2 to 7% were recommended for official action.

It would seem that larger estates or even the same small estates should show a better position in 1937 when the production will undoubtedly be greater because of the increased export allowances.

Bulletin Board Contact

THERE is a constant need of an effective method of disseminating to factory operators instructions regarding company policies or machine and process operation as well as advice relating to safety and recreational activities. A recent survey made by the Metropolitan Life Insurance Co. indicated very active use of the bulletin board in industrial companies and showed the nature of material usually posted to follow these percentages: Safety 53; Instruction 17; Group Insurance 13; Health 8; Social 7; Inspirational 1; and Employes' Advertising 1.

Factory employes in general do show a definite interest in the bulletin board and will watch for new notices. It is necessary, however, to put the board in a convenient and conspicuous place and to attend it so as to permit posted notices to remain only a sufficient length of time for the group of operators to become familiar with the contents. In the case of safety or other notices which convey a general message that is of value at all times the notices will be most effective if they are replaced within short intervals, preferably not longer than one week. If desirable, the same notice may be reposted after a considerable period has elapsed.

Variety and attractiveness should be a guiding factor in maintaining an active bulletin board so that the operator will be constantly expecting the appearance of new notices of interest to him. Continual well-planned attention to the selection, arrangement, and frequent changing of the notices on an attractive board is necessary to maintain the desired interest and thereby to make certain that the messages will reach all of the employes in that group.

EDITOR

What the Rubber Chemists Are Doing

A. C. S. Rubber Division Activities

Los Angeles Group

THE last indoor meeting of the season of the Los Angeles Group, Rubber Division, A. C. S., was held May 4 at the Mayfair Hotel, Los Angeles, Calif., attended by approximately 90 members and guests. A talk and moving pictures were presented by Guy M. Ball, Pacific Coast manager of the Irving Air Chute Co., Inc., Glendale, Calif., on the subject "What It Means to Drop." He explained the process of manufacture and methods of folding parachutes and described the precautions to be taken when jumping.

Lloyd Roberts, special representative of the Los Angeles Harbor Department, showed movies of the harbor development and told of the rapid growth of marine commerce at Los Angeles Harbor, which in total tonnage now ranks second to New York. He extended to the rubber men an invitation to enjoy a harbor excursion during the Foreign Trade Week.

Charles Rhodes gave an impersonation of popular Hollywood stars, and an entertainer amused the audience with a 15-minute display of the art of the magician. William Shawger, of the D. & M. Machine Works, Torrance, Calif., described briefly the work of his company. The reaction was that sketches of this nature are desirable and should be encouraged.

Announcement was made of a golf tournament to be held May 15. Ed Royal said that at least 12 had expressed their intention to take in the summer deep sea fishing trip, but details had not yet been completed. The next indoor supper meeting will be held in October.

L. L. Horchitz, Goodrich, won the door prize, an eight-day wrist watch donated by Godfrey L. Cabot Co., Inc., Boston, Mass., through its local representative, Bert Doherty. A. Cressy, of the Cressy Machine Co., won a full vision auto mirror with clock, and Roy Renouf, of the Olympic Engineering Co., received a similar mirror without a clock, both of which were donated by *The Rubber Age*. The raffle prizes, five tickets to the next meeting, presented by Ed Royal, of the H. M. Royal Co., Los Angeles, were won by F. H. Cota, of Goodyear, William J. Harvey, of Kirkhill, J. M. Robbins, of Goodrich, Charles Lamb, of West American, and Charles Rhodes, guest entertainer. Dinner favors, hard rubber ash trays, were contributed by E. M. Smith Co.

Chicago Group

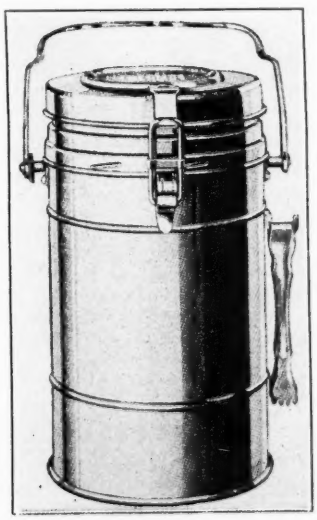
A MEETING of the Chicago Group, Rubber Division, A. C. S., was held May 7 in the College Inn of Hotel Sherman, Chicago, Ill. A very fine floor show and orchestra entertained during the dinner, attended by 110 members and guests.

H. D. Bainbridge, a member of the group and a well-known rubber technologist, affiliated with the International Smelting & Refining Co., Anaconda Zinc Oxide Division, East Chicago, Ind., presented a technical paper on the subject, "A New Physical Test for Rubber Compounds." The second paper of the evening was given by F. G. Arnold, chief chemist, of the Rapid Roller Co., Chicago. His subject was "The Use of Rubber and Synthetics in the Graphic Arts."

This meeting was the last to be held until next fall.

New York Group

AN ACTIVE committee has completed all arrangements for the fourth annual outing of the New York Group, Rubber Division, A.C.S., to be held at the Alp's Castle, Preakness, N. J., near Paterson, on Saturday, June 12. The plans call for a program of sports and entertainment throughout the day, beginning with golf matches in the morning and ending with a fine dinner and the awarding of prizes late in the afternoon.



Tennis Trophy by Flintkote Co.

Golfers are advised that the Preakness Hills Country Club course has been secured for their use with the proviso that all players must be off before 11 A.M. No one will be permitted to start after that hour.

There will be the usual softball tournament, tennis, boccie, horseshoe pitching, etc., together with several professional boxing bouts. The United Carbon Co. is again offering a handsome trophy for golfers. The Flintkote Co. is providing a trophy for tennis, and the soft ball teams will compete for the INDIA RUBBER WORLD cup. There will also be numerous other contest and door prizes. Beer, hot dogs, and sandwiches will be available all afternoon.

W. W. Higgins (United Carbon) is chairman of the picnic committee, assisted by W. C. Lingvall (U. S. Rubber). Golf will be in charge of H. B. McCreary (United Carbon); soft ball, Fred Conover (Naugatuck Chemical); tennis, Richard Opper (U. S. Rubber); boccie, James Carroll (Carroll, Inc.); horseshoe pitching, D. C. McRoberts (Kaysam); and boxing, O. G. Work (Overman Tire).

The general committee for the outing includes: G. Becktel (American Oil), Carl J. Wright (General Atlas), P. Murawski (Du Pont), K. Gillespie (Stamford Rubber Supply), J. R. Keating (Binney & Smith), Emil Schwartz (General Electric), K. J. Soule (Manhattan), Peter P. Pinto (*Rubber Age*), C. A. Bartle (Du Pont), N. J. Freley (Naugatuck), G. S. Haslon, (N. J. Zinc), K. Carey (Okonite), L. D. Ackerman (Seamless), Harry Trecken (U. S. Rubber), D. C. McRoberts (Kaysam), F. E. Traflet (Pequanoc), Walter Ritz (United Carbon), W. O. Hamister (Naugatuck), Philip Felderman (Muehlstein), A. H. Nellen (Lee Tire), and Wm. Malone (General Supply).

Tickets at $2.50 each include everything except the golf fee, which is $1.50 per player, and may be obtained from B. Brittain Wilson, INDIA RUBBER WORLD, 420 Lexington Ave., New York, secretary-treasurer of the group; Peter P.

Pinto, of *Rubber Age*, 250 W. 57th St., New York, or any member of the committee.

To reach Alp's Castle motorists may use Route 23 from Newark or Route 4 from the George Washington Bridge. The Erie and Lackawanna railroads run to Paterson, where a taxi may be taken for the five miles to the scene of the day's festivities.

Akron Group

THE Akron Group, Rubber Division, A. C. S., has completed plans for this year's summer outing to be held June 18 at the Silver Lake Country Club. The committee on golf has arranged prizes for several events, and the golf course will be open to the group all day Friday. Several special features have been arranged, and an excellent dinner will be served in the evening. Reports indicate that a "bang-up" time will be enjoyed by those who attend.

Boston Group

ON MAY 7 the Boston Group, Rubber Division, A. C. S., held its spring meeting at Hotel Kenmore, Boston, Mass. The dinner in the Crystal Room was attended by 137 members and guests, and several others appeared later to hear Dr. A. R. Kemp, of Bell Telephone Laboratories, Inc., New York, N. Y., describe the details connected with the laying of submarine cables. Chairman Royce N. Noble introduced Dr. Kemp who illustrated his talk with pictures of the manufacture of cable in the Point Breeze, Md., factory of Western Electric and of the laying of cable off the coast of Key West, Fla., and Havana, Cuba. Some of the difficulties encountered by a cable-laying ship in a storm were portrayed in a sound movie which showed the actual laying of a high-speed cable between Bay Roberts, Newfoundland, and Hotora in the Azores Islands.

Submarine cable was first successfully laid in 1866, and until 1924 approximately 300,000 miles had been laid with essentially the same type of cable. Then "Permalloy" a new nickel alloy was introduced which decidedly improved the transmitting capacity. Prior to 1924 cables for submarine use had been produced only in England and Germany. In 1930 a further advance in cable construction and effectiveness was realized through the development of "Paragutta" as an insulating material ideal for the installation of high-speed telephone cable, which is superior to gutta percha. "Paragutta" can be made from Balata. The rubber can be vulcanized in as short a time as ten seconds. Every foot of cable is tested as being laid, both from shore and from the boat. Dr. Kemp emphasized the importance of continued research regarding construction and application of rubber products and explained that Western Electric Co., Inc., and its affiliated companies held the position of being both manufacturer and consumer.

At the conclusion of Dr. Kemp's talk a sound film entitled "Devil's Playground" featured George Vanderbilt's recent South Sea fishing cruise in which he encountered barricuda, sailfish and sharks with many exciting experiences taking place.

Cards were passed around for members to indicate their preference of date for an outing and their desire for golf and other sports. Definite arrangements have not yet been made.

A. C. S. Notes

H. L. TRUMBULL, chairman, Rubber Division, American Chemical Society, has announced that the following members have agreed to act as a committee on arrangements for those wishing to attend the International Conference of the Institution of the Rubber Industry for 1938 in London, England; Dr. A. A. Somerville, chairman; J. M. Bierer; W. B. Wiegand.

Mr. Trumbull has also announced the appointment of Dr. R. H. Gerke as chairman of the division's crude rubber committee, effective after the next meeting of the committee, called for June 4 in Akron by the present chairman, H. Gray.

Dr. Elmer K. Botton, chemical director of E. I. du Pont de Nemours & Co., Inc., has been elected a director of the American Chemical Society to succeed Dr. Frank C. Whitmore, of Pennsylvania State College, who will become president of the society January 1, 1938.

Vulcanization Accelerators

AT A meeting of the Rubber Division of the Toronto Chemical Association held March 12 at Toronto, Canada, Dr. W. F. Tuley, of Naugatuck Chemical Division of United States Rubber Products, Inc., Naugatuck, Conn., talked on "Vulcanization Accelerators." He stated that the subject of accelerators may be considered in three main divisions: (1) mechanism of action; (2) chemical composition and properties; and (3) relation to properties of the vulcanizate. His discussion concentrated on the second part.

Dr. Tuley traced the history of the use of organic accelerators in the development of the rubber industry. Zinc oxide, litharge, magnesium oxide, lime, and caustic soda had been used for a number of years. No other important contribution had been made for approximately 65 years. In 1905 George Oenslager, employed by the Diamond Rubber Co., Akron, O., discovered and actually used HgI_2, but the results were not successful. Mr. Oenslager then investigated the organic bases and found p-nitroso dimethyl aniline to give remarkable results, but it stained yellow everything, including the worker's hands. In an attempt to find a less toxic derivative than aniline, in 1906 thiocarbanilide was produced and put into tires experimentally, and in 1907 the Diamond Rubber Co. adopted aniline for the carcass and thiocarbanilide for the treads in all of its tires. Thiocarbanilide continued as the principal accelerator of the industry until about 1922. American developments were not divulged. In 1933 at New York, George Oenslager was awarded the Perkin Medal as the discoverer of organic accelerators.

The public knowledge of organic accelerators began with the issuance of the Gottlieb and Hofmann patents assigned to the Beyer Co. of Germany in 1913-1914. The expansion of the field of organic accelerators really began in 1918 and 1919 when large American chemical and rubber companies enlarged their staffs. At present the list of accelerator patents in the United States alone totals over 500.

Then Dr. Tuley discussed the origin and use of present important commercial accelerators which he classified according to composition and properties into the three following groups: (1) organic bases (polysulphide), including aliphatic and aromatic amines, aldehyde amines, and guanidines; (2) carbo-sulphydryl (SH linked to carbon), including thio ureas, thiazoles, dithiocarbamates, and non-nitrogen accelerators as xanthates, dithio acids and trithio carbonates; (3) miscellaneous, including nitroso compounds as well as selenium and tellurium compounds. He emphasized the fact that neither the low manufacturing cost nor the quality of present-day rubber products would be possible without organic accelerators.

New Antiscorch Material

A NEW material to resist the scorching of rubber compounds has recently been placed on the market by Naugatuck Chemical Division of United States Rubber Products, Inc., 1790 Broadway, New York, N. Y., and is to be known to the trade as A-F-B. It is effective with all types of accelerators, particularly aldehyde amines and accelerators of the mercaptobenzothiazole type. It is especially useful in highly accelerated stocks which are most likely to give scorching trouble in the factory. Two to eight ounces of A-F-B per 100 pounds of rubber should be used, depending upon the scorching resistance desired. A-F-B antiscorch is a modification of U-T-B and has been found much more effective than the latter for preventing scorching of mixed stocks during processing or storage. The melting range of A-F-B is 90 to 110° C. Its specific gravity is 1.50.

Editor's Book Table

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(*Continued on page 72*)

NEW PUBLICATIONS

"Rex-Weld and Rex-Tube Flexible Metal Hose." Chicago Metal Hose Corp., Maywood, Ill. With a profusion of unusually fine illustrations this new manual tells a comprehensive picture-story of the how-when-and-where to use flexible metal hose to advantage. Technical data are given on the use of flexible metal hose for saturated steam and superheated steam, for the conveyance of fluids and chemicals, and numerous special uses as vibration absorbers for compressors, pumps, and turbines, compensators for high-temperature pipe lines, equalizer connections for gas burning furnaces. Two distinct types of tubing, annular corrugation (Rex-Weld) and spiral wound (Rex-Tube) are treated comprehensively, providing a valuable reference guide to users of either or both of these types of tubing.

"Witcombings." Wishnick-Tumpeer, Inc., 295 Madison Ave., New York, N. Y. The April issue of 12 pages contains news items regarding plant and industrial progress, a short article on the Kathanode auto battery and an article on "Emphasis on Color" by Vivian Vorsanger.

"Polyphase Motors." Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo. This illustrated loose-leaf Wagner Bulletin 182, comprising 64 pages, describes construction details and mechanical variations of squirrel-cage motors, Polyphase, vertical, enclosed, explosion-proof, and fan-cooled motors. It also covers control equipment, slip-ring motors, Fynn-Weichsel motors, and motor applications on air conditioning equipment, etc.

"Industry Discovers Latex." Safetex Co., Inc., 77 Riverdale Ave., Port Chester, N. Y. This six-page booklet briefly recounts the rapidly extending applications of latex as a protective coating for textile and metal products against the destructive influence of water and acid. Many other uses of latex are enumerated as becoming of increasing interest as the technique of manipulation is developed.

"Guide on New York and Federal Unemployment Insurance Law." Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y. A loose-leaf pamphlet published under the New York Unemployment Insurance Service. It is the purpose of this guide (1) to keep the employer informed by means of periodic reports regarding the laws involved, regulations and opinions, editorial matter and decisions concerning these laws; and (2) to assist the employer with recommended forms, record systems, and bookkeeping procedures whereby his records can be utilized to the fullest extent in compiling his tax report. The cost and terms of payment by subscribers are outlined.

"Rubber Peptizing Agent, RPA No. 2." E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. The 11-page report No. 198, issued by the Rubber Chemicals Division, states that continued study of the problem of softening crude rubber by chemicals has resulted in the development of RPA No. 2, which is more effective and economical than RPA No. 1. Through descriptive matter, graphs, and tables, this pamphlet gives the composition, methods for using, and effects of RPA No. 2 in conjunction with the softening of crude rubber and reclaimed rubber.

"The Du Pont Magazine." Vol. 31, No. 5, May, 1937. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. This 26-page magazine, copiously illustrated, presents part II of "Chemistry and You," which consists of excerpts from a recent address delivered by Dr. C. M. A. Stine in which he discusses the chemist's work in connection with the textile, rubber, petroleum, metal, and refrigeration industries. Another article deals with the artistic design of the Washington and Jefferson College commemorative service plates and the Lamberton art pottery by the Scammell China Co. of Trenton, N. J. The publication also includes articles on "Fine Packages for Fine Things"; "Safety in Industry," a review of the du Pont record: "The Largest Open Pit Iron-Ore Mine," a story of the development of mining methods; "Little Ladies of Fashion," telling of the use of mannequins to display garments made of "Acele," "The Mark of a Master," a brief description of weapons used by the modern hunter; "The Key to Orderly Locks," showing many "Pyralin" hair accessories; and a pictorial story of products made from plastics.

"Strip Chart Recording Instrument." General Electric Co., Schenectady, N. Y. A 32-page catalog describes the improved CD-type recording instruments. Some of the outstanding features of these instruments are: the D'Arsonval electrodynamometer, iron-vane repulsion and resonant-circuit electric elements; the improved recording mechanism; a writing table and hinged window that makes it possible to make notes on the chart without removing the cover; and the compactness which permits mounting with six-inch centers and having a "suitcase" shape that permits it to be carried easily. The approximate dimensions are 6 by 13 by 15 inches. The catalog contains also detailed data concerning types, kinds, uses, part replacements, various kinds of charts, prices, etc.

"Indicating Thermometer Catalog." Consolidated Ashcroft Hancock Co., Bridgeport, Conn. A 45-page catalog describes various types and sizes of indicating thermometers with special fittings.

"The Vanderbilt News." Vol. 7, No. 3, May-June, 1937. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. Rubber matters and materials are discussed in this 24-page magazine. Fourteen pages of discussion, tabulated results of tests, and a graph are devoted to "Compounding Rubber for Definite Hardness" which covers four series of compounds of Shore hardness values ranging from 10 to 85. An eight-page article on "How Loading Materials Affect Flex-cracking" describes tests and conclusions and presents in tables and graphs the results of comparative studies of a number of commonly used loading materials in a standard pure gum compound.

"Goma," issued bi-monthly, under the direction of Dr. R. Ariano, at Via Spontini No. 5, Milan, is the first publication in the Italian language to be devoted exclusively to rubber technology. In the copy just received, Vol. 1, No. 2, for March-April, 1937, Dr. Ariano has an article on extension tests with flat test pieces, and S. Oberto discusses the development of heat during vulcanization. There are besides a number of translations and abstracts from foreign articles.

"Oxwelding for General Maintenance." Linde Air Products, Inc., 205 E. 42nd St., New York, N. Y. This illustrated booklet, F. 2282, tells of the widespread utility of the oxy-acetylene welding and cutting process in the efficient maintenance or rehabilitation of industrial equipment, showing how maintenance work can be simplified and speeded up. There are descriptions of actual instances of work done and savings made.

"Precautions and Safe Practices." Linde Air Products, Inc., 205 East Forty-second St., New York, N. Y. This booklet, F. 2032, gives a concise outline of the do's and don't's of oxy-acetylene welding and cutting and has been completely revised and greatly enlarged. All users of the oxy-acetylene process should have a copy of this new edition to study and understand thoroughly all the recommendations offered under this subject.

"Patterson Pebble and Ball Mills." The Patterson Foundry & Machine Co., East Liverpool, O. This profusely illustrated catalog, No. 372, covers general industrial applications and typical recommendations for adaptation. Special topics treated include laboratory mills, details of mill equipment, mill linings and grinding media, various mill types, and new drives.

"Compounding Materials Used in the Rubber Industry." Industrial Safety Series No. Ru. 1, Part I—Accelerators, Antioxidants, and Dry Organic Compounds (Classification and Health Haz-

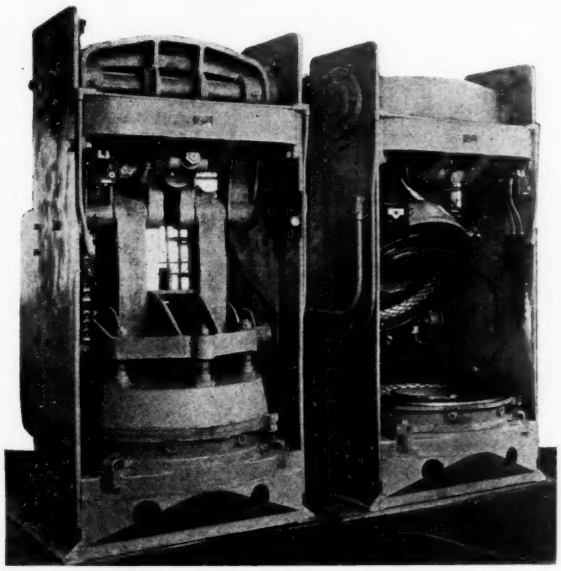
(*Continued on page* 80)

New Machines and Appliances

Tractor Tire Gage

Schrader Tire Gage

A NEW gage No. 7750-T, has recently been developed for measuring the air pressure in pneumatic tires on tractors. Calibration ranges from the low pressure of 4 pounds up to 50 pounds in one-pound graduations, and the gage is built on the direct action principles, thus permitting accurate measurement and close control of the pressure such as is necessary for tractor use. A. Schrader's Son, 470 Vanderbilt Ave., New York, N. Y.



(*Right*) Summit Truck Tire Presses

Automatic Tire Presses

THE Summit Mold & Machine Co., Akron, O., has made rapid strides within the last two years in the development, of individual presses for curing tires and tubes. The press is entirely automatic, and in the smaller sizes one operator, on a 40-minute curing cycle, will handle 70 to 80 presses. The accompanying photo shows two of a battery of 77 truck tire presses for curing the popular sizes from 32 by 6 up through 9.75/22 or 10.50/20.

These presses are electrically operated through a single motor driven power unit with ample parallel action between mold halves on the closing and opening strokes. Summit presses are equipped with patented automatic air evacuation of the mold at the beginning of the cure and automatic air ejection of the tire when the press opens at the end of the cure. These presses will accommodate a range from a 24 by 1½ bike tire or tube, up to and including a 13.50/32 or 10.00/40 farm implement size.

Banbury Mixer Improvements

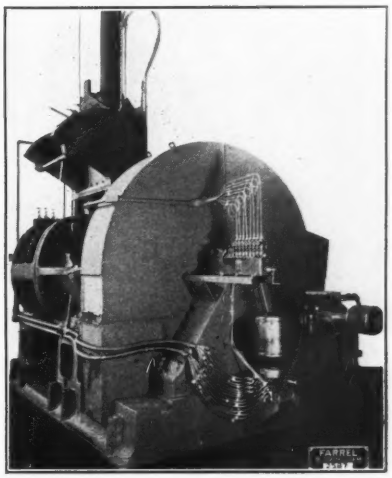
TO MEET the greater demands made on Banbury mixers, several improvements have been announced by the manufacturer.

Hot Breakdown

Formerly the temperature, when mixing or breaking down of rubber, was maintained as low as possible with the most efficient cooling system, which was around 225 to 230° F. Recently it has been decided that mixing and particularly breaking down of crude rubber can be done better at higher temperatures. Some people are breaking down rubber at about 350° F. and in some cases even higher than 400° F. These high temperatures have contributed to the need of better lubrication, inspection in process, and temperature control during the operations.

Lubrication

High-pressure forced feed automatic lubricators have been applied not only to the main bearings of the mixer, but also to the outboard bearings and thrusts and to the ways of the sliding discharge door. The arrangement of this positive lubrication system makes it possible to regulate the amount of lubricant going to each bearing. The photograph shows the copper lines from the grease lubricator and the conduits in which they are enclosed. Just above the grease lubricator is the McCord force feed oil lubricator for supplying oil to the dust stops.



Banbury with Pressure Lubrication

Temperature Control

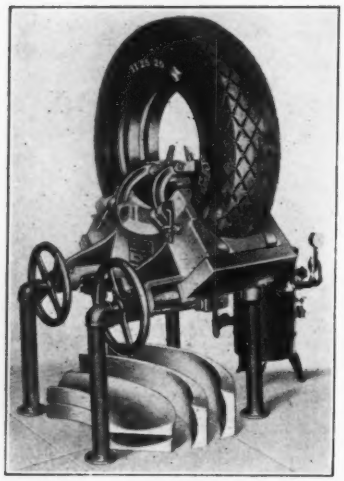
Because of the development of faster accelerators and the tendency toward shorter breakdown at higher temperatures, more accurate temperature control is now necessary; consequently the pyrometer potentiometer has replaced the previous recording thermometers so as to reduce the time and temperature lag in the readings. If desired, readings from this instrument may be recorded at a reasonable distance from the Banbury mixer.

Dust Stops

The development of materials having greater wear resistance and the application of ample forced feed lubrication has resulted in dust stops which require less maintenance cost.

Internal Inspection

A door has been placed on an opening at the rear of the charging hopper and the batch in process can be inspected from above and without stopping the mixer. Examination of the interior can be made much easier and safer through this door than formerly when it was necessary to make this inspection through the discharge opening. The operator can look down on the mixing operation and thus obtain a better view without danger of injury. Farrel-Birmingham Co., Inc., Ansonia, Conn.



Bacon Tire Mold

Full Floating Tire Section Mold

THE full floating feature of this tire repair mold embodies the action of the side plates which float freely in the mold to conform to the tire size. Spacers for the tread radius and width assure correct setting of the mold. A self-adjusting steel clamp eliminates bead distortion troubles. All connections are metal; no hose is used. The steam connections are so arranged that heat can be applied to one side only for spot-patching with a sand bag, or the heat can be applied to both sides, the repair is made to the toe of the bead.

The molds come in two sizes to accommodate diameters from 14 to 21 inches in practically all sizes. The larger size of press, complete for handling truck tires weighs approximately 2,000 pounds and occupies a floor space of about 3½ by 4 feet. The smaller machine weighs about 725 pounds and requires about 2 by 2 feet of floor space. Bacon Vulcanizer Mfg. Co.

New Washer Punch

THE new washer punch illustrated cuts washers out of metal, fabric, gasket material, fiber, steam packing, straw board, asbestos, leather, felt, cork, rubber, bakelite, mica, and any other similar material up to $\frac{1}{8}$-inch thickness. With only 18 hardened dies, furnished with the machine, it is possible to obtain 150 different washer sizes from $\frac{1}{8}$ to 1$\frac{3}{8}$-inch. The unit is very compact and sturdy in construction and does not require any preliminary set-up or adjustment before operating. The dies are mounted in an eccentric turret plate, thereby placing them all as close to the edge as possible and making it more convenient to center and withdraw the washers from the machine. The centering system incorporated insures concentric punching. Ideal Commutator Dresser Co.

Rotary Scrimp Brush

Cloth Wrinkle Remover

THIS rotary scrimp brush, running on ball bearings, acts as a guide roll and as a wrinkle remover for fabrics going to a winding machine or calender. The bristles, set at an angle, stretch the cloth toward the edges, and the deflection of the bristles is sufficient to eliminate wrinkles. The extent of this action can be varied by the tension placed on the fabric. The brush is three inches in diameter. The unit includes the supporting brackets, thus enabling ready installation. The Bristle Stretcher Expander Co., 32 Kent St., Somerville, Mass.

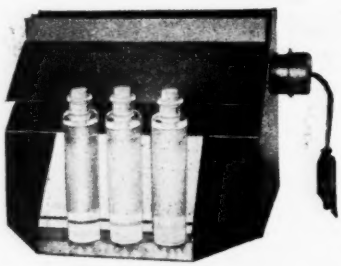
Clarity Tester

A PRACTICAL device for laboratory and works control for observing the clarity of liquids and estimating traces of suspended matter shows clearly differences of one part per million (0.0001%). It requires only visual side-by-side comparison of samples in stock bottles and can be set up close to the work so as to control the product.

The principle on which this device is built consists in providing proper illumination on the samples against an unlighted, practically invisible, black background. With respect to diffusion, color, and intensity, the illumination can be modified by diffusion plates and color filters according to the requirements of each problem.

After the liquid sample, in any convenient bottle, has been placed on the observation platform of the Clark clarity tester, suspended matter may be observed both nephelometrically (by reflected light) or turbidimetrically (by transmitted light). Quantitative results may be obtained by comparison with known mixtures and suspensions or with permanent standard suspensions in gelatine which can be furnished to order.

This apparatus is furnished with electrical connection, is of simple construction, can be carried easily, and has a shipping weight of only 20 pounds. Laboratory Equipment Co.



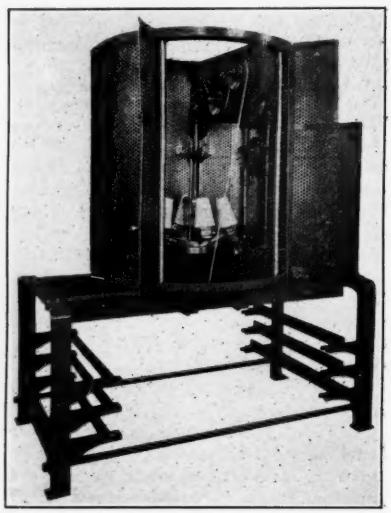
Clark Clarity Tester

Hose Jacket Knitting Machine

A NEW machine has been developed for knitting the reenforcing jacket for hose such as pump tubing, garden hose, etc., as a substitute for the regular braided jacket. This machine is driven by a ½-hp. motor, and the entire unit, consisting of motor, driving gears, and knitting mechanism, is enclosed in a metal guard with doors on a large opening so as to give easy accessibility to the mechanism.

(*Continued on page* 93)

Ideal Washer Punch



Hose Jacket Knitter

New Goods and Specialties

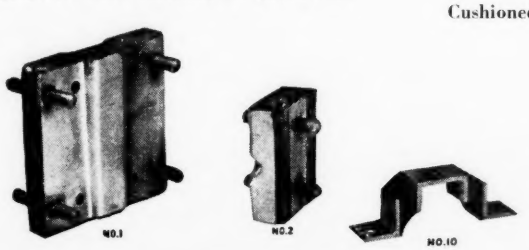
Vibro-Insulators

THE use of rubber suspensions for the elimination of vibration and noise has been used for some time in connection with automotive engineering. Recently this principle has been applied to the installation of many types of industrial equipment, ranging from small motors and machines to rubber masticators weighing 80 tons.

Because the Vibro-Insulator is designed to carry loads in shear, it has a sensitivity to movement eight times greater than if the rubber carried the load in compression. A properly designed metal spring will cushion a vibrating object; yet it will transmit sound rather freely and will resonate severely at its fundamental frequency. But these disadvantages do not occur in the use of rubber mountings, it is claimed.

Although special types of mountings are required for extremely heavy machines and high deflections, 95% of all field requirements in average factories can be covered by three standard types as illustrated. Types 1 and 2 are furnished in a standard size, but type 10 is made in various lengths proportionate to the load to be carried. One compound with one hardness is used for all standard Vibro-Insulators.

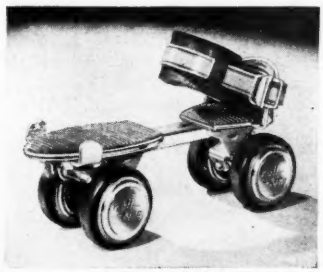
Fatigue studies have shown a great reduction in nervous strain on the operators tending the units after Vibro-Insulators were installed on seven machines; these weighed a total of 238 tons. The B. F. Goodrich Co., Akron, O.



Vibro-Insulators

Rubber Cushioned Roller Skates

A NEW kind of roller skate, "Roll Kings," was introduced at the Toy Fair held at the Hotel McAlpin, New York, N. Y., during April. These skates, "cushioned-in-rubber," have solid rubber tires; rubber sole and heel pads on the metal support plates; rubber mountings for the back and the front axles, which give "knee action" to the wheels. These rubber parts eliminate noise, shock, and vibration. Also a sponge rubber strap guard prevents chafing of the ankle and wear on the stockings. Metal Specialties Mfg. Co.



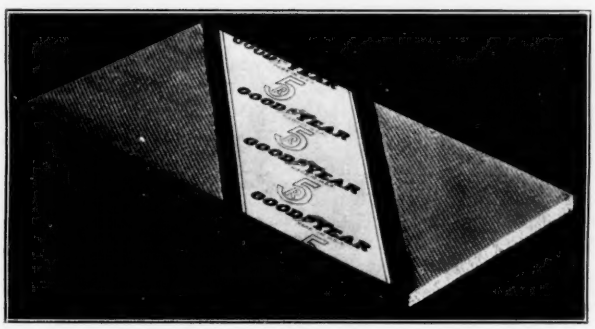
Cushioned-in-Rubber Skates

Low Tension Belt

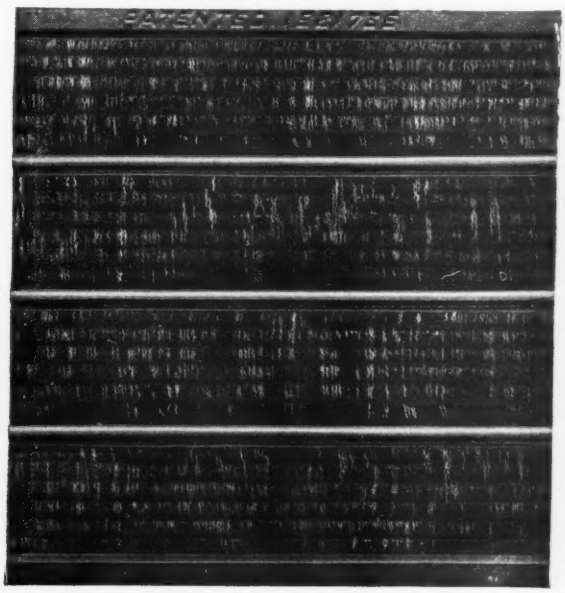
THIS new "5-R" belt is made by completely impregnating the belting fabric with a newly perfected non-resinous compound. The greatly increased pulley grip gives the belt greater pulling power and permits lower tension, thus increasing the belt life and lessening the strain on the belt fasteners. The lower tension also reduces the bearing pressures with the accompanying lower friction losses and reduced number of lubrication problems. The name was derived from the fact that in a normal installation the ratio of tension between the tight side and the slack side is 5 to 1. Goodyear Tire & Rubber Co.

Spintex Battery Separator

AMONG the new developments in the 1937 automotive market is the new type of battery separator consisting of a rubberized fabric, ribbed and appearing much like a standard cedar separator. Special advantageous features of the new separators are high degree of porosity permitting rapid circulation; endurance in protecting the plate materials the entire life of the plates. When battery plates buckle in extremely severe service, the new rubberized separators more effectively withstand the pressure exerted against them. The batteries containing the new type of separators are said to possess one-sixth longer life than those of ordinary contsruction. Globe-Union, Inc.



"5-R" Belt



Spintex Battery Separator

Rubber Industry in America

FINANCIAL

Unless otherwise stated, the results of operations of the following companies are after deductions for operating expenses, normal federal income taxes, depreciation, and other charges, but before provision for federal surtax on undistributed earnings. Most of the figures are subject to final adjustments.

American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y., and subsidiaries. March quarter: net income $1,364,640, equal to 54¢ a share on common stock, against $738,015, or 29¢ a share last year.

American Wringer Co., Inc., Woonsocket, R. I., and subsidiaries. For 1936: net income $160,667, equal to $1.44 each on 111,244 capital shares, contrasted with net loss in 1935 of $13,153.

American Zinc Lead & Smelting Co., Columbus, O., and subsidiaries. First quarter, 1937: net profit, $92,530 after depreciation, depletion, normal federal income taxes, and other charges, but before surtax on undistributed income. After dividend requirements on 4,041 shares of old $6 cumulative preferred stock still outstanding and 64,834 shares of $5 convertible prior preferred stock, the net profit was equal to about a cent each on 650,254 shares of $1 par common stock. In the March quarter, 1936, the company showed a net loss of $43,305. Net sales for the 1937 period increased 95.9% to $3,764,689, from $1,921,364 in the first quarter of 1936.

Twelve months ended with March net profit after similar deductions amounted to $188,172, or $2.73 each on 4,041 shares of old $6 preferred and 64,834 shares of $5 prior preferred. There was a net loss of $236,225 in the corresponding period of 1936.

The company said it would hold open until July 15 the plan under which holders of old preferred stock may convert it into prior preferred and common.

Baldwin Rubber Co., Pontiac, Mich. March quarter: net profit, $176,050, equal to 63¢ each on 278,604 capital shares, against $121,086 or 43¢ a share last year.

Columbian Carbon Co., 41 E. 42nd St., New York, N. Y., and subsidiaries. First quarter, 1937: net earnings, $1,448,536 after all charges and taxes except federal surtax on undistributed profits. The earnings, which include a profit of $119,433 on the sale of securities, equal $2.69 a share on the 537,411 shares outstanding. In the March quarter of 1936 earnings were $1,028,153, or $1.91 a share.

Dominion Rubber Co., Ltd., Montreal, P. Q., Canada, and subsidiaries. For 1936: net loss, $93,056, compared with $11,515 loss in 1935.

Dunlop Rubber Co., Ltd., London, England. For 1936: profit of £1,502,707 after guaranteed preference dividends of subsidiaries, debenture interest, and other charges, but before taxes, compared with £1,288,244 in the previous year. After transfer of £394,900 to taxation reserve, net profit for 1936 was £1,107,877 before transfer of £150,000 to reserve for contingencies and £100,000 to general reserve, compared with net profit of £868,483 in 1935.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and wholly owned subsidiaries. First quarter, 1937: net income, $16,013,346 after allowance for depreciation and obsolescence, and provisions for interest and federal income taxes, including surtax on undistributed profits in 1937. This result compares with $14,713,782 earned in the March quarter a year ago. After deducting debenture dividends and including $432,622 company's proportion of undivided profits of controlled companies not consolidated, a balance was available for common stock in the first three months of this year, totaling $14,806,572, equivalent to $1.34 a share on 11,047,838 shares of $20 par average number of common shares outstanding during the period. These earnings include dividend from General Motors investment amounting to 22¢ a share on du Pont common stock. In the first three months of 1936, the balance available for common stock, including $316,913 company's proportion of undivided profits of controlled companies not consolidated, was $13,391,299, equal to $1.21 each on 11,053,462 average common shares. Earnings for this period included dividends from General Motors investment amounting to 45¢ a share on du Pont common. Profit and loss surplus on March 31, 1937, was $240,816,606, against $226,236,594 on December 31 and $213,432,051 on March 31, 1936.

Everlastik, Inc., Chelsea, Mass. For 1936: net loss, $46,144, against loss of $87,231 in 1935.

Flintkote Co., E. Rutherford, N. J., and subsidiaries. Twelve weeks ended March 27: net income, $193,585 after depreciation, federal income, state and capital stock taxes, and other deductions, but before federal surtax on undistributed profits. This is compared to a net income of $35,298 for the corresponding period of the previous year which covered thirteen weeks. After eliminating extraordinary income received in settlement of patent infringements and other claims, the profit for the 1937 period was $186,376, or 28¢ a share, and for the period ended March 28, 1936, was $35,298, or 5¢ a share.

Gillette Rubber Co., Eau Claire, Wis. For 1936: net income after surtax, $448,445, equal to $2.24 each on 199,762 common shares, against $305,303, or $1.53 a common share, in 1935.

Hewitt Rubber Corp., Buffalo, N. Y. March quarter: consolidated net income of $103,553 after charges, reserves and taxes except possible federal surtax on undistributed profits, equal to 61¢ a share on the common stock outstanding at the end of the period. No comparison is available due to capital changes. In the first quarter the company sold 52,000 shares of common stock, the proceeds from which were used to retire funded debt.

I. B. Kleinert Rubber Co., 485 Fifth Ave., New York, N. Y., and domestic subsidiaries. Year ended December 31, 1936: net profit of $168,141 after depreciation, federal income taxes, and $3,251 provision for federal surtax on undistributed profits, etc., equivalent to 98¢ a share on 170,515 shares (par $10) of capital stock, excluding 19,485 shares in treasury. This compares with $158,958, or 92¢ a share on 171,715 shares in 1935. Current assets as of December 31, 1936, amounted to $2,609,387, and current liabilities were $329,859 against $1,974,756 and $301,624, respectively, at the end of 1935.

Laher Spring & Tire Corp., Oakland, Calif. For 1936: net income, $7,508, equal to $1.24 a share on 6,041 7% preferred shares, against $7,351, or $1.28 each on 5,741 preferred shares, in 1935.

Lima Cord Sole & Heel Co., 807 N. Jackson St., Lima, O. Two months to February 28: net income, after tax, $29,495, against net income of $15,892 before tax in the first two months of 1936. Gross sales were $253,882, against $145,411.

Martin Custom Made Tires Corp., 645 Eleventh Ave., New York, N. Y. First quarter of 1937: profit before adjustment of taxes and depreciation, $17,300, against $1,740 in the same period last year. Sales totaled $211,507, against $106,058, respectively, for these periods.

Offering was made recently of 50,000 shares of $5 par 8% cumulative convertible preferred stock of the Martin corporation by Gearhart & Lichten-

stein. The stock was priced at $5 a share. The proceeds will be used as follows: $90,000 for additional equipment and initial operating expenses of its new plant, $25,000 to repay a bank loan, and the balance for the payment of current obligations. The new stock is redeemable, in whole or in part, at any time on 90 days' notice at $6 a share. Underwriting commissions on the offering amount to $1 a share, or a total of $50,000, according to the prospectus.

The company reported gross sales of its predecessor company for 1936 as $692,942, against $515,058 in 1935. Net income last year was $14,515.

Monsanto Chemical Co., St. Louis, Mo., and subsidiaries. March quarter: net profit, after estimated surtax, subsidiary preferred dividends and minority interest, $1,333,854, equal to $1.20 a share on 1,114,408 shares of $10-par capital stock. This compares with $1,032,852, or $1.03 a share on 999,123 shares last year. Sales and earnings continued their upward trend during the first quarter, both constituting all-time peaks for any three-month period.

National Rubber Machinery Co., Akron, O. Year ended December 31, 1936: profit $64,482 after taxes and charges; loss $81,382 in 1935.

New Jersey Zinc Co., 160 Front St., New York, N. Y. First quarter, 1937: net income $2,169,841, equal to $1.10 a share on 1,963,264 shares of $25 par capital stock, and compares with $1,074,179, or 55¢ a share in the initial quarter last year.

Norwalk Tire & Rubber Co., Norwalk, Conn. Six months to March 31: profit before federal income taxes, $42,917, contrasted with net loss of $31,025 in same period a year before.

O'Sullivan Rubber Co., Inc., Winchester, Va. Year to March 31: net earnings before interest paid and provision for Federal income taxes, $162,297, compared with net earnings of $74,935 on same basis for calendar year 1936.

An offering to the public was made May 4 by Hill Thompson & Co., Inc., by prospectus, of $350,000 first mortgage 5½% sinking fund bonds due on April 1, 1947 of O'Sullivan Rubber Co. The price was 98 and accrued interest, this to yield 5.77%. The bonds carry non-detachable warrants for the purchase of stock in the ration of 30 shares for each $1,000 bond at $5 a share to April 1, 1942. Provision is made for a sinking fund amounting to $10,000 a year, plus 10% of earnings. The bonds are redeemable in whole, or in part, on any interest date on not more than three weeks' and not less than two weeks' notice at 105 if retired before April 1, 1938, and thereafter at gradually decreasing prices to maturity, with accrued interest in each case. Proceeds of this financing will go to paying off current indebtedness and for additional working capital.

Okonite Co., Passaic, N. J. For 1936: net income, $456,653, equal after preferred dividends to $32.69 each on 12,000 common shares, against $203,836, or $12.80 a common share the year before.

Pharis Tire & Rubber Co., Newark, O. Twelve months to March 31: net profit, $284,050, equal to $1.29 each on 200,000 outstanding shares of $1 par. This is after surtax on undistributed profits for the nine months of 1936, but not for the first quarter of 1937. Report includes earnings of predecessor company for the nine months and twenty-seven days ended Jan. 27, 1937, and of the successor company from that date until March 31, 1937.

Pirelli Co. of Italy, Milan, Italy. For 1936 (in Italian lire): net income, 32,498,000 lire, compared with one of 28,934,000 lire the year before.

Raybestos-Manhattan, Inc., Passaic, N. J. Quarter ended March 31, 1937: net income, $674,504.41, or $1.06 per share on the company's stock, after providing for all charges, expenses, and taxes, and adding $50,000 to the reserve for contingencies for the surtax on undistributed profits. In the same quarter of the year prior, net income was $365,720.78, or 57¢ per share, before providing for the surtax.

Samson Corp., including Samson Tire & Rubber Co., 5725 Telegraph Rd., Los Angeles, Calif. For 1936: net income, $249,298, contrasted with net loss of $9,819 in 1935.

Servus Rubber Co., Rock Island, Ill. For 1936: net income, $125,617, contrasted with net loss of $52,919 in 1935.

Thermoid Co., Trenton, N. J., and domestic subsidiaries, including Southern Asbestos Co., Charlotte, N. C. March quarter: net profit, $140,394, equal after quarterly dividend requirements on 40,556 shares of $10 par, $3 preferred stock, to 24¢ each on 458,334 shares of $1 par common stock. This compares with $45,106, or $1.48 a share on 30,417 shares of 7% preferred stock outstanding in March quarter a year ago. Net profit for the twelve months ended with March was $309,085, equal after allowing for twelve months preferred dividend requirements on $3 preferred stock, to 41¢ a common share. Net income for the corresponding period of the previous year was $76,513 or $2.51 on old 7% preferred stock.

United Carbon Co., Charleston, W. Va., and subsidiaries. March quarter: net profit, $722,368, equal to $1.81 each on 397,885 shares of no-par common stock, compared with $567,831 or $1.32 a share last year.

The United Shoe Machinery Corp. of New Jersey and Maine, 140 Federal St., Boston, Mass. Fiscal year ended February 27: net income, $11,316,128 after federal income taxes and other charges. After dividend requirements on the 6% preferred stock, the income was equivalent to $4.74 each on 2,291,958 shares of $25 par common stock, excluding 37,631 shares held in the treasury. In the preceding fiscal year, the companies earned $10,267,643, or $4.28 a share on 2,290,938 shares of common stock, excluding 38,651 treasury shares. Current assets at February 27, including $23,216,818 cash and marketable securities, amounted to $35,143,026; current liabilities were $8,904,068. On February 29, 1936, cash and marketable securities totaled $23,432,644, current assets, $34,635,163, and current liabilities, $6,095,757.

White (S. S.) Dental Mfg. Co., Philadelphia, Pa. March quarter: net profit, $138,404, equal to 46¢ each on 300,000 shares of $20-par capital stock. Net profit a year ago was $71,393, or 24¢ a share.

Converse Rubber Co., Malden, Mass., and subsidiaries. Year to March 31: net income, $202,466, equal after preferred dividend requirements, to $2.78 each on 60,000 common shares. This compares with $157,543 or $2.13 each on 57,232 common shares outstanding at the close of the preceding fiscal year.

Dayton Rubber Mfg. Co., Dayton, O., and subsidiaries. Nov. 1, 1936, to Feb. 25. Consolidated net profit, $201,229. In fiascal year ended on October 31, 1936, company had a consolidated net profit of $510,465.

Lee Rubber & Tire Corp., Conshohocken, Pa. Six months to April 30: net income, $473,277, against $101,297 a year before.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Anaconda Wire & Cable Co.	Com.	$1.00 increased	June 21	May 21
Boston Woven Hose & Rubber Co.	6% Pfd.	$3.00 s.	June 15	June 1
Dayton Rubber Mfg. Co.	Com.	$1.00	June 25	June 10
Faultless Rubber Co.	Com.	$0.50 q.	July 1	June 15
Firestone Tire & Rubber Co.	Pfd.	$1.50 q.	June 1	May 15
B. F. Goodrich Co.	Com.	$0.50 resumed	June 30	June 21
B. F. Goodrich Co.	$5 Pfd.	$1.25 q.	June 30	May 31
Goodyear Tire & Rubber Co.	$5 Pfd.	$1.25 q.	June 15	May 15
Goodyear Tire & Rubber Co.	Com.	$0.50	June 15	May 15
Hewitt Rubber Corp.	Com.	$0.25	June 5	May 25
Hewitt Rubber Corp.	Com.	..... q.	June 5	May 25
Martin Custom Made Tires	8% Pfd.	$0.10 initial	June 15	June 1
Mid-West Rubber Reclaiming Co.	$4 Pfd.	$1.00 q.	June 1	Apr. 20
Okonite Co.	6% Pfd.	$1.50 q.	June 1	May 25
Pahang Rubber Co., Ltd.	Com.	$0.25	June 25	June 17
Pharis Tire & Rubber Co.	Com.	$0.15 q., initial	May 20	May 5
Pirelli Co. of Italy, Am. Shares, A.	Com.	60 lire, final		
Raybestos-Manhattan, Inc.	Com.	$0.37½ q.	June 15	May 28
Thermoid Co.	$3 Conv. Pfd.	$0.75 q.	June 15	June 4
United Elastic Co.	Com.	$0.15 q.	June 24	June 4

EASTERN AND SOUTHERN

CONDITIONS throughout the nation are spotty, and after many months of very good business a slump, more than seasonal, is expected this summer. Labor difficulties also continue as a disturbing factor although strike settlements in some areas stimulated business. In the South and other rural districts, however, prospects of large crops are good.

A recent report of the National Industrial Conference Board indicates average hourly earnings in manufacturing industry have markedly increased from 24.7¢ in July, 1914, to an average of 64.6¢ the first three months of 1937, an advance of 162%. At present hourly earnings in manufacturing are at the highest point ever recorded since industrial statistics have been regularly compiled. Weekly earnings, however, because of the shorter work-week today, have not shown so great an increase as hourly earnings. In the first quarter of the current year the work-week averaged 41.4 hours, against 51.5 hours in July, 1914. But average weekly earnings are now 111% higher, averaging $26.76 in the first quarter of 1937 as compared with $12.68 in July, 1914. As weekly earnings have risen to a considerably greater extent than has the cost of living, the purchasing power of wages today is 48% higher than in July, 1914.

U. S. Rubber News

United States Rubber Products, Inc., 1790 Broadway, New York, N. Y., has appointed Dr. Earl G. Sturdevant as consulting engineer of its electrical wire and cable department. Since 1920, when he took his doctorate at the University of Michigan, Dr. Sturdevant has been connected with many important scientific developments in the rubber field. After a two-year interval of teaching at the University of Western Ontario he joined the technical staff of Western Electric and there developed a method of continuous cure for rubber covered wire. Dr. Sturdevant came to U. S. Rubber in 1929, working in cooperation with the development staff at its General Laboratories in Passaic. He contributed to the process of forming a rubber thread directly from latex, the process used in making the elastic core of "Lastex." In 1931 Dr. Sturdevant was appointed development manager of the electrical wire and cable department, where he contributed to the successful development of "Laytex," the revolutionary new dielectric. In his new consulting capacity he will apply his extensive technical knowledge to the perfection of U. S. Rubber's wire and cable products and to the rubber company's many developments in the rubber field to insulated wires and cables.

Earl G. Sturdevant

H. A. Everlien, sales manager, mechanical goods division, U. S. Rubber Products, announced that effective May 1, J. E. Power, manager mechanical sales, New York district, was transferred to 1790 Broadway, as assistant sales manager, mechanical goods division. Mr. Power has been with the company since 1906. His successor at the New York branch is R. V. Hilands, manager of the Philadelphia and Baltimore districts, who joined the company in 1913 as salesman. He, in turn, is succeeded by A. B. Means, of the Philadelphia sales organization, employed by the company in 1916. R. F. Jackson, of the Baltimore sales organization, has been named assistant manager mechanical sales, Baltimore branch. He began with U. S. Rubber in 1916 as salesman. E. P. Cole, of the Denver sales organization, has been made manager mechanical sales, Denver branch. Mr. Cole has filled the positions of western manager mechanical division, manager mechanicals in Minneapolis and in Columbus since joining U. S. in 1910.

The Providence, R. I., plant of U. S. Rubber has won the $300 award given by President F. B. Davis, Jr., in the company's 1936 safety contest. The plant, which employs 2,000 workers, has not had a major accident in nearly two years.

Four hundred and fifty employes of the organization's footwear plant, Naugatuck, Conn., were honored for the excellence of their workmanship during April, at a spring festival quality party on May 12. These employes were winners in the monthly contests between departments and between mills in producing footwear without damage. This is the fourth year quality contests have been held, and the success of these efforts can be determined by the high standing attained by various units in the plant. New low damage records have been made. The evening was carefully planned to provide dancing, games and entertainment. The quality contests have been directed by S. L. Sammis and W. E. Bittle. Miles Long was chairman of the party, assisted by Ray Hotchkiss, master of ceremonies. Guests of honor were 50 years' service employers, who are Charles Wood, William Bell, John McKeon, Joseph Holmes, F. C. Conklin, Martin Sullivan, Catherine Sugrue, Emily Bell, Nellie Campbell, and Nora Stratton.

U. S. Tire Dealers Mutual Corp.

The second meeting of the Dealer Advisory Council of U. S. Tire Dealers Mutual Corp. was recently held at the U. S. Tire factory, Detroit, to discuss tire merchandising policies of mutual interest to the company and its dealers. Attending were two new council members, C. L. Dorman, of San Diego, Calif.; and J. E. Wright, of Wright Tire Service, Little Rock, Ark.; as well as Milton Rosen, St. Paul; Joseph H. Walsh, Jacksonville; William P. Yoerg, Holyoke; Harry Bielfield, Detroit; and Edward N. Cummings, Portland, Ore. U. S. Rubber officials who met with the council included L. D. Tompkins, vice president; H. N. Hawkes, general sales manager; H. A. Farr, J. C. Ray, R. W. Collings, C. A. Ostrom, and F. M. Stewart, of the general office staff; A. B. Fennell, H. O. Bock, H. C. McDermott, and R. C. Tucker, divisional sales managers.

After discussion of a number of merchandising subjects, the council made the following recommendations:

1. That those members of the industry who have not yet discontinued the Road Hazard Guarantee, should do so at once. They cited that from a strict business viewpoint the policy was unsound. Also, that its discontinuance would help to eliminate reckless and careless driving.

2. That, in principle, the council favors the fair trade legislation now in effect or proposed by a number of states. In event that participation of the tire industry should be secured, every logical effort should be made to take advantage of whatever opportunity is provided by laws of this type to bring about more stable conditions.

Council members were conducted on an inspection tour of the factory by R. E. Sheahan, general manager of plants. They also met with S. P. Thacher, manager of the tire engineering and service division, and Dr. Sidney M. Cadwell, director of the development division. The factory, incidentally, is humming at capacity operation to meet the demand of car manufacturers for original equipment and that of motorists for replacement tires.

A. C. Bowers

Pennsylvania Rubber Co., Jeannette, Pa., recently held its annual two-day sales conference attended by more than one hundred representatives, including salesmen, branch managers, and executives from various parts of the country. The gathering was welcomed by W. A. Atkins, chairman of the board, and A. C. Bowers, newly elected president. Advertising and merchandising plans for the year were discussed by A. Koehler, general sales manager; Charles M. DuPuy, advertising manager; and William S. Walker, president of Walker & Downing, the company's advertising agency. Mr. Bowers, who had been vice president and general manager, was named president at the annual stockholders' meeting April 14.

Wishnick-Tumpeer, Inc., 295 Madison Ave., New York, N. Y., has announced that Melville Vaughan, formerly chief chemist at the Witco owned Pioneer Asphalt Co.'s plant in Lawrenceville, Ill., has joined Witco's technical staff in the East, where expansion of the company's development and research laboratory facilities has been under way for several months. After graduating from the University of Illinois in 1928 Mr. Vaughan became tire compounder with The B. F. Goodrich Co. He joined Wishnick-Tumpeer in 1930 and since that time has been engaged in development work at the company's plants in Louisiana, Texas, and Illinois. Working with Mr. Vaughan in organizing the new centralized laboratory, at 251 Front St., New York, the old offices of Wishnick-Tumpeer, is E. M. Allen, who came to Witco late last year from the research laboratories of the Chemical Division of the Pittsburgh Plate Glass Co., where he made several major developments.

Vulcanized Rubber Co., Morrisville, Pa., manufacturer of hard rubber products, reports business declined in May.

Hohwieler Rubber Co., Morrisville, Pa., is operating overtime with increased orders. The concern will shortly market a new product.

American Society for Testing Materials, Philadelphia, Pa., will hold its fortieth annual meeting in the Waldorf-Astoria Hotel, New York, N. Y., June 28 to July 2. Throughout the week there will also be in progress the fourth exhibit of testing apparatus and related equipment.

Carbon Black Freight Rate

The proposed carload freight rate increase of $1 per ton on carbon black to and between all points in the United States, will be argued on June 16 before Examiner Griffin in the Interstate Commerce Commission offices, Washington, D. C. The date for presentation of the opposition was previously set for May 24 and later extended to June 16. The original proposal was to have become effective April 20, but because of objection registered by the Rubber Manufacturers Association and a group of carbon black producers the I. C. C. ordered a suspension of the date to become effective until November 20, 1937, or such prior time as a decision is made after a hearing has been permitted.

Rubber in New Mellon Institute Building

In the new $10,000,000 building of the Mellon Institute of Industrial Research, Fifth and Bellefield Aves., Pittsburgh, Pa., which was dedicated May 6, 22,460 pounds of rubber were used largely in flooring and wire insulation. The wire sizes ranged from No. 16 down to No. 0000. The largest installation was 246,000 feet of No. 12, and the next largest was 113,000 feet of No. 10. The large general office floor is covered with green rubber tile. This office is one of the main centers of the building, and through it passes all the business of the Institute with the outside world, including the relations between the executive staff and the research fellows, their correspondence, records and reports.

Society of Chemical Industry, American Section, 305 Washington St., Brooklyn, N. Y., has announced the election of the following officers for 1937-38: chairman, James G. Vail; vice chairman, Wallace P. Cohoe; honorary secretary, Cyril S. Kimball; honorary treasurer, J. W. H. Randall. The following new committee members were elected to take the place of retiring members: W. W. Winship, P. K. Frolich, Foster Dee Snell, F. A. Lidbruy, and G. M. Norman.

At a meeting of the American Section on April 9, Dr. Snell, retiring honorary secretary, was presented with an engraved watch in recognition of his twelve years of active service. Dr. Robert J. Moore, past chairman, made the presentation and expressed the appreciation of the American Section for Dr. Snell's faithful carrying out of his secretarial duties.

American Gas Products Corp., a subsidiary of American Radiator & Standard Sanitary Corp., both of 40 W. 40th St., New York, N. Y., has purchased from Consolidated Edison Co. the Ensign-Reynolds, Inc., 40 W. 40th St., New York, manufacturer of industrial gas equipment. Through the acquisition of this company American Gas Products has materially broadened its line and is now prepared to serve industrial companies with various types of industrial gas burning equipment as gas filters, ribbon burners, inspirators, air cleaners, flame distributers, gas compressors, and special burner tips.

Neal Lang, for some years assistant to the general manager of the Park Central Hotel in New York, is now greeting his many friends in the rubber industry at the Hotel New Yorker, where he is banquet manager. Lang numbers among his friends many executives in the rubber and tire industry and is well known in Akron, not only as a hotel man, but also because of his knowledge of the rubber industry.

Mellon Institute Office

Innis, Speiden & Co., dealer in chemicals, etc., 117 Liberty St., New York, N. Y., last month sent two of its executives, H. G. Mackelcan, vice president in charge of sales, and G. S. Hamilton, vice president and comptroller, to Europe on a six-week business trip to visit Germany, Czechoslovakia, Austria, France, and the British Isles.

Dr. Carl Magnus, editor of *Gummi und Asbestzeitung* arrived in New York from Vienna, Austria, on May 25. He left New York on May 27 to see his son in Milwaukee, Wis., and plans on visiting several rubber and allied companies during his stay here. According to present plans, he expects to sail for home June 19. Dr. Magnus said that he was very happy to be back in America after an absence of 38 years when he spent three years here as representative of Continental-Caoutchouc Cie. At that time there were few automobiles here and, of course, no tire industry.

Dunlop Tire & Rubber Corp., River Rd., Buffalo, N. Y., suffered a loss of several thousand dollars recently when a fire raged for several hours at its warehouse.

Neoprene Bostik Cements

To the original line of special solvent Bostik cements developed by the German affiliate of the American manufacturer has been added the Neoprene Bostik cements. These new cements are especially applicable for rubber to Neoprene bonds in insulated cable and hose manufacture. The two lines of Bostik cements are made in United States by B. B. Chemical Co.

New Incorporations

Filatex Corp., Jersey City, N. J. Capital 4,000 shares at $100 each and 200 shares common stock, no par value. G. S. Hills and H. Taylor, both of 50 Broadway, and H. C. Simpson, 122 E. 42nd St., all in N. Y. Principal office 15 Exchange Place, Jersey City. To manufacture all kinds of rubber goods, rubber substitutes, and synthetic goods.

Schacht Rubber Co., Inc., Huntington, Ind. Capital 5,000 shares at $100 each. W. J. Schacht, J. K. Mason, and L. M. Bowers. Manufacture general rubber goods.

Seven Oaks Rubber Corp., New York, N. Y. Capital $20,000. J. T. Robbins, 20 Graham Ave., Brooklyn.

Smyth Rubber & Packing Co., 512 Mercer St., Jersey City, N. J. W. V. Smyth, Homestead, Fla., and P. H. Smyth, Manhasset, L. I., N. Y. Rubber goods.

Sport Rubber Products Corp., New York, N. Y. Capital 100 shares preferred stock and 100 shares common stock, no par value. Buchdahl & Lempel, 276 Fifth Ave., New York. Rubber products.

OBITUARY

W. H. Carothers

W. H. Carothers

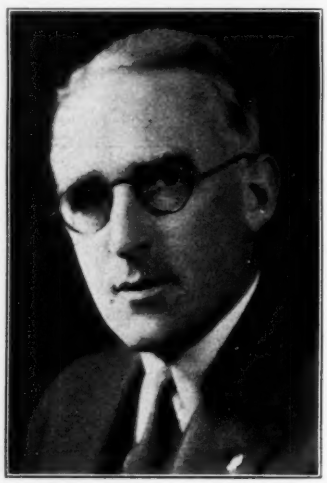
DR. WALLACE HUME CAROTHERS, who died on April 29, 1937, in Philadelphia, Pa., was an important figure in the development of synthetic rubber. Born at Burlington, Iowa, in 1896, Dr. Carothers was graduated with a B. S. degree from Tarkio College in 1920. He received his M. S. from the University of Illinois in 1921, and his Ph.D. in 1924.

He remained at the University of Illinois as an instructor for two years and in 1926 joined the faculty at Harvard University, where he served until becoming associated with the E. I. du Pont de Nemours & Co., Inc., in 1928 as a research chemist.

Dr. Carothers' work in the field of synthetic rubber and the development of Neoprene won for him wide scientific acclaim. In 1936 he was elected to membership in the National Academy of Sciences, being the first industrial chemist to win this honor. In addition to his work in Neoprene, he had done research on catalytic hydrogenation, valence theory, polymer, and acetylene derivatives.

Dr. Carothers also held membership in the American Chemical Society, the American Association for the Advancement of Sciences, the German Chemical Society, the Swiss Chemical Society, and the Chemical Society of London. He was the author of various scientific papers, was an associate editor of the *Journal of the American Chemical Society* and a member of the editorial board of *Organic Syntheses.*

Surviving are his wife, his parents, a brother, and a sister.



Bachrach

Elmer E. Dearth

Elmer E. Dearth

ELMER E. DEARTH, general manager of the Mansfield Tire & Rubber Co., Mansfield, O., died recently after a brief illness. Mr. Dearth first became associated with the rubber industry in 1912, soon after graduating from Lowell Textile School, Lowell, Mass., when he became chemist and fabric inspector of the Federal Rubber Co., Cudahy, Wis. In 1916 he joined Lee Tire & Rubber Co., Conshohocken, Pa., as industrial engineer, but resigned two years later to become secretary-treasurer of the New Jersey Car Spring & Rubber Co., Jersey City, N. J. In 1922 Mr. Dearth entered the employ of The Fisk Rubber Co., Chicopee Falls, Mass., by signing as assistant to the factory manager of Fisk's western factory at Cudahy, the former Federal company. In 1925 he was made factory manager and continued as such until the fall of 1927 when he was transferred to Chicopee Falls to organize and manage product development work at the main and western factories. He was appointed general plant manager in 1930 and resigned in May, 1933. Shortly after he went to Mansfield.

The deceased was born in Lowell, February 4, 1891.

He belonged to the Society of Automotive Engineers, The Tire & Rim Association, Inc., Mansfield Chamber of Commerce, and City Foremen's Club, Fritz Lodge No. 420, F. & A. M., Mt. Vernon Chapter, No. 8, R. A. M., N. J. Consistory S. P. R. S. 32nd degree Salaam Temple, and A. A. O. N. M. S.

He leaves his wife, his father, and two brothers.

Burial was at Norristown, Pa.

Oregon Rubber Mat Co. has moved to 8910 S. E. Stark St., Portland, Ore. The firm, in its fourth year, produces the Million Mile rubber mat, a combination hand and machine processed door mat made of automobile tire rubber and metal fittings.

OHIO

GENERAL manufacturing concerns report operations are holding up very well, but that the volume of orders has slowed down, a condition usual this time of year. Unseasonal weather in some districts, however, adversely affected trade.

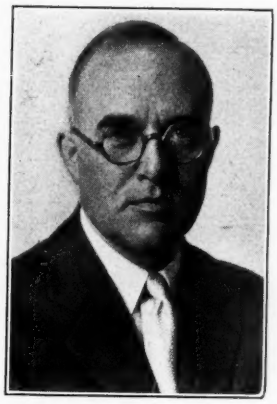
With the heavy tire replacement season approaching and inventories smaller than at the end of 1936, operations must be advanced steadily if the estimated 32,000,000 replacement units are to be turned out in 1937. Other divisions of the rubber industry also are ahead of the 1936 figure, with production roughly around 90% of capacity; boots and shoes showed the lowest increase, for carry-overs were heavy.

Firestone Tire & Rubber Co., Akron, on April 28 announced settlement of a strike which had thrown 9,000 workers out of work for two months. The agreement was reached and signed by the company and United Rubber Workers of America negotiators. The settlement marked the first time a rubber company had signed an agreement with the U. R. W. A. The agreement provided:

1. Company to reemploy as rapidly as possible all workers now on strike.
2. Resumption of plant operations as soon as possible.
3. Company not to finance any labor group or organization for collective bargaining. Abolishing the Firestone "company union" plan.
4. Union not to intimidate or coerce employes and to refrain from soliciting membership on company time or company property.
5. Company recognition of the union as the representative of such Firestone employes as desire union services.
6. Union to ban sit-down strikes.

The Patterson Foundry & Machine Co., East Liverpool, O., has opened a Pittsburgh office, in the Bessemer Building, and D. M. Wilhelm is in charge. He has been connected with Patterson for many years: first, in the production department, then in charge of sales at the New York office. At the Pittsburgh branch an engineering department will be maintained as well as a district purchasing department.

The Columbia Alkali Corp., Barberton, O., through W. I. Galliher, director of sales, has announced the appointment of J. F. Dockum as district sales manager of New England with offices at 300 Babcock St., Boston, Mass. Since his graduation from the University of New Hampshire, Mr. Dockum has been associated with Columbia at the Barberton plant, and has spent considerable time in various departments and for the last several years has devoted his efforts to sales relating to all company's products.



James D. Tew

Goodrich Activities

Directors of The B. F. Goodrich Co., Akron, at a meeting following the annual stockholders' meeting, on May 5, elected S. B. Robertson, formerly executive vice president, president of the company to succeed J. D. Tew, who declined to permit his name to be offered for reelection. Mr. Tew, who retired from active business after 31 years with the company, will continue as a member of the executive committee and board of directors. At the annual stockholders' meeting all directors whose terms of office expired were reelected. Officers and members of the executive committee were also reelected at the directors' meeting.

Mr. Tew, in announcing his retirement from presidency of the Goodrich company, on May 3, told the members of the Twenty-Year Club that he started with the Goodrich company on January 10, 1906, rolling and cleaning liners at 15¢ an hour and working a minimum of 10½ hours a day. He said that in 1910, after he had transferred to the Diamond Rubber Co., which merged with Goodrich in 1912, he was sent to England to learn the Palmer Cord tire process and upon his return supervised the manufacture of the first successful cord tires made for gasoline vehicles. In his subsequent years with Goodrich, Mr. Tew filled, successively, the posts of general tire superintendent, assistant works manager, works manager, vice president, and president, to which office he was elected in 1928. He gave as his reason for retiring the fact that he had promised himself to quit active business at the age of 55.

"I know that to many of you 55 seems young," he explained, "but believe me when I tell you that an executive of a big corporation burns up about two years of his life every 12 months."

Bolivar Studios, Inc.

S. B. Robertson

Goodrich soon will start operations at its new tire and tube manufacturing plant at Oaks, Pa., formerly a rubber reclaiming unit of Philadelphia Rubber Works, a Goodrich division. The converted factory will make 4,000 tires and tubes daily, and 450 persons will be employed five days a week. Of the 450, 100 will comprise the office force and engineering and service divisions. Arthur Kelly is plant superintendent. The plant has 175,000 square feet of floor space, of which 150,000 will be used for manufacturing purposes.

On May 26 President Robertson announced that James J. Newman, for four years a vice president, has been made also general manager of the Goodrich tire division.

Amos D. Moss, Goodrich director of purchases, was elected a member of Commodity Exchange, Inc., New York, N. Y., at a recent meeting of the board of governors.

Thirty-seven employes on the Akron payrolls of the company joined the organization prior to 1900. They have a combined service record of 1,484 years with the company, or an average of 40.19 years. Their ages range from 54 to 75 years, with the total age of the group 2,267 years and the average 61.27 years. Dave Suloff and Pete Seiler, of the tire division, and Fred Meier, of the processing division, are first, second, and third in point of service. Suloff started work at Goodrich in 1889, Seiler in 1890, Meier in 1891. Among officials in the group are B. F. Stauffer, general manager of the Miller plant, hired in 1893; A. C. Simmons, manager of mail and telegraph department, 1896; John E. Noonan, superintendent of the processing division, 1898; Earl V. Carter, manager of passenger traffic, and Mr. Moss, hired in 1899.

Sheepmen in the Uvalde section of Texas are using rubber bands instead of surgery to bob lambs' tails, accord-

ing to information received by Goodrich. The newest method of tail bobbing involves only the tight application of a rubber band in the right location which stops circulation. After a time the tail drops off, saving expense, time, and trouble for ranchmen and some pain and possible infection for the lambs.

New Goodrich President

Samuel Brown Robertson, new Goodrich president, entered the rubber business after a long and successful career as a railroad official. He was born in Milton, Mass., July 21, 1878, attended local grade and high schools there, and was graduated from Massachusetts Institute of Technology in 1899 with the degree of Bachelor of Science. He entered railroad service shortly after.

After a period as railroad division engineer Mr. Robertson was made superintendent in the Pennsylvania Railroad system, later becoming general superintendent for the central system of the Pennsylvania lines.

He joined Goodrich in 1919 and soon became the company's director of engineering. In 1928 following the construction of the Pacific Goodrich Rubber Co. plant in Los Angeles, Calif., which he supervised, he was elected vice president and general manager there, continuing in that capacity until September 9, 1931, when he returned to Akron as vice president and general manager of the Goodrich tire division. He was elected a director of the company in February, 1937, and made executive vice president at the same time. Mr. Robertson is also a director of Goodrich Silvertown Stores, the company's retail division; Miller Rubber Co., Inc., and The B. F. Goodrich Rubber Co. of Canada, Ltd.

He is married, lives in Akron, and is the father of a married daughter. He belongs to Akron City and Portage Country clubs, Canadian Club of New York, and the Jonathan Club of Los Angeles. His principal recreations are golf, fishing and hunting.

The Oak Hill Rubber Co., Oak Hill, has been reorganized and has been operating since April 16, 1937, as The Oak Hill Sponge Rubber Co. with the same personnel as in the past and will continue to manufacture the same items as heretofore, i.e., cut sponge, died sponge, molded sponge and specialties, sheet sponge rubber, bath sponges, chair cushions. L. P. Waldron is president and general manager; W. A. Byrider, Jr., secretary-treasurer.

Pharis Tire & Rubber Co., Newark, through President Carl Pharis, has announced the election of W. A. Patterson as vice president and W. I. O'Bryan as secretary-treasurer. Mr. Patterson, formerly sales manager, has been with the company 16 years and prior to that worked for The B. F. Goodrich Co. and the Firestone Tire & Rubber Co. Mr. O'Bryan has been with Pharis ten years.

W. A. Patterson

Mr. Pharis also announced the purchase of a factory building on West Main and Eleventh Sts., Newark, where, it is understood, the company's general and executive offices would be moved as soon as necessary remodeling is completed. The present offices will be used as additional plant operation space.

The Goodyear Tire & Rubber Co., Akron, using its 37,000-acre ranch at Litchfield Park, Ariz., as a training ground, has organized the Future Farmers' Flying Squadron, which will provide an all-around, three-year training course in practical and theoretical farming for its members. At the conclusion of their training squadron members will be given the opportunity to purchase their own tracts of land and establish themselves as independent farmers. For the purpose of the original experiment, conceived by P. W. Litchfield, Goodyear president, 12 young men are now undergoing their initial training. First year will be devoted to gaining experience in all the farming operations available, second year to tenant farming on an experimental basis, and the third year each man will be responsible for a definite tract of land which may be purchased under an equitable time-payment plan, if desired by the individual student farmer. In undertaking this pioneer effort Mr. Litchfield has as his goal the desire to demonstrate the feasibility of accomplishing reemployment through the utilization of land and to encourage colonization of the great undeveloped areas of the Southwest, particularly Arizona, where millions of acres are available. Application of supervised, scientific training methods to develop the prospective farmers occurred to Mr. Litchfield as a result of the success achieved with the Goodyear factory Flying Squadron which he originated and organized in 1913. This group, benefitted by a three-year course in operations of the rubber industry and augmented annually by a limited number of selected men, has proved an important factor to maintenance of balanced production in Goodyear's many factories.

Rubber Products Makers' Association of Lake County was formed at a meeting May 3 when dissolution of the old organization was granted by members of the employes' association of the Ohio Rubber Co., Willoughby. The old association was formed in 1933 and had 900 on its roster. The new organization, with a seven-fold program for the benefit of rubber workers, has been incorporated, and its membership is open to all rubber workers except company executives. The aims of this association follow:

1. To promote social activities and good fellowship.
2. To better working conditions of rubber craftsmen in Lake County, and generally in the rubber industry.
3. To negotiate for its members and rubber products makers desiring its services with the employers of such persons.
4. To develop better methods and processes of manufacture in the rubber industry.
5. Educate its members in the technical crafts of the industry.
6. To own or lease property necessary for the work of the association or for the promotion of its activities.
7. To succeed to all working agreements contracts and leases now in existence and belonging to the employes' association of the Ohio Rubber Co.

Columbia Alkali Co., Barberton, has awarded the contract for the construction of a laboratory and office at an estimated cost of $100,000.

LEGAL

Patent Suit

On April 12, 1937, a decree was entered by the United States District Court in Cincinnati, O., in the case of the United Shoe Machinery Corp., 140 Federal St., Boston, Mass., v. The O'Donnell Rubber Products Co. et al., directing that The O'Donnell Rubber Products Co., Cincinnati, be enjoined from infringing claim 11 of the MacDonald patent No. 1,661,572, except as licensed. Claim 11 of the MacDonald patent relates to the utilization of a hot-air blast with a folding machine, for activating the precoated margin of the work, such as French binding, as it enters the folding machine. This decree follows a decision of the United States Circuit Court of Appeals, rendered June 4, 1936, sustaining claim 11 of the MacDonald patent as valid and infringed.

The O'Donnell Co., however, is continuing its sale of Torridaire heat units for use with folding machines, for folding French binding, in view of an agreement with the United Shoe Machinery Corp., whereby the O'Donnell company is licensed under the MacDonald patent.

NEW JERSEY

FEW rubber manufacturing plants in New Jersey are affected by labor troubles at this time. Officials declare that strikes have resulted in concerns losing business which in some cases goes to other firms. There have been two increases in the price of hose since the first of the year: 5% increase late in the winter and another 5% in early May. Prices on other products remain the same.

The Rubber Manufacturers Association of New Jersey will hold its annual outing and dinner at the Trenton Country Club, Trenton, N. J., early in June. The afternoon will be devoted to golf. John A. Lambert, of the Acme Rubber Co., Trenton, is president of the association.

Jos. Stokes Rubber Co., Trenton, recently laid off many hands because of a decline in business following a strike at its plant. Officials believe trade will pick up again shortly. Milton H. Martindell, vice president and secretary-treasurer, left late in May for a business trip through the West and also to the company's plant in Canada. The latter concern reports business as being very good.

Lambertville Rubber Co., Lambertville. The Court of Chancery has appointed John T. Crowley, president of the Lambertville Rubber Co. as temporary trustee. Proceedings are now under way for reorganization of the concern under the National Bankruptcy Act. Creditors and stockholders were notified that hearing in the case would be held before Federal Judge Philip Forman the latter part of May, when it would be decided if Mr. Crowley should be made permanent trustee. About 100 employes have been called back to work, and the plant is now turning out tennis shoes and boots. The concern expects to manufacture other footwear later.

Estate of Andrew Bell, 55 Commercial St., Newark, is now H. R. Bell & Son, 93 Green St., manufacturer of "The Bell" washers and other plumbers' supplies.

Lawrence M. Oakley, of the Essex Rubber Co., Trenton, spent three weeks in New England, where he visited the company's branches and the trade. He reports a pick up in the sole and heel trade.

Pierce-Roberts Rubber Co., Trenton, is still operating with three shifts, but business has dropped off to some extent.

Near Para Rubber Co., Trenton, reports a big increase in orders for reclaimed rubber, with the factory working overtime.

The Pocono Co., Trenton, finds business has slackened up a little, but the concern continues to operate normally.

The Thermoid Co. strikers, Trenton, have returned to their work after having been out for some time. A new agreement was signed by Fred E. Schluter, Thermoid president, and officials of the United Rubber Workers of America. The strikers took a vote on the proposition to return. The new scale increases the pay from 45 to 48¢ an hour; while women will receive 40¢ an hour instead of 39. Piece workers earning 60¢ an hour or less will receive a 5% increase. Working hours have been increased from 40 to 45 with overtime at the rate of time and a half instead of time and a third. Workers employed four years or more will get a week's vacation with pay. Three employes discharged before the strike will be rehired. Nearly 1,500 employes were on strike, and work has been found for all but 175, who will be given jobs later. Trouble marked the strike, and three score State troopers were assigned to the plant by Governor Hoffman. Several arrests were made for disorderly conduct. The New Jersey Chancery Court had issued a restraining order against pickets at the plant.

At the annual meeting of Thermoid Co., last month, stockholders approved the granting of options to officers and employes to buy on or before April 12, 1940, not more than 25,000 shares of the company's common stock at $12 a share.

David Van Alstyne, Jr., recently was elected a director of The Thermoid Co.

Whitehead Bros. Rubber Co., Trenton, is running with three shifts with plenty of orders on hand to continue a 24-hour day for some time.

Mercer Rubber Co., Hamilton Square, continues busy although there has been a little decline in business. The company has announced another 5% increase in the price of hose, this being the second during 1937.

New Phenolic Resins

A NEW line of improved thermosetting phenolic resins in both liquid and powdered forms has been designed for numerous industrial bonding applications. Certain types, when used with rubber and drying oils or by themselves in impregnating or bonding loose or woven asbestos, give the finished product a higher heat resistance, more strength, and a uniformly stable coefficient of friction. Other resins in this series are used to improve the properties of fixed resistance units or the bonding of ground cork in the production of stronger, more flexible, and more heat-resisting gasket stock. Still other forms are used for the production of laminated tubes using the dry resin process with excellent results.

MIDWEST

IN the Midwest, industries not subject to strikes are operating on high schedules. Automobile production has been at seasonal peak, and steel plants are on full time. Zinc and lead properties also are active, with production of record proportions. Shoe manufacturers report good gains in earnings. Improved weather has aided farmers, with consequent increase in their purchasing power.

Gillette Rubber Co., Eau Claire, Wis., in expanding its Kansas City, Mo., branch leased space at 2420-26 Broadway.

American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y., on May 15 moved its Detroit, Mich., office to 931 Fisher Bldg.

Globe-Union, Inc., manufacturer of storage batteries, spark plugs, roller skates, and Centralab radio products, 900 E. Keefe Ave., Milwaukee, Wis., as a sales promotion device has constructed on a truck a giant replica of a Globe battery and is traveling these unique service cars in conjunction with distributers' operations. A removable panel on the door permits a ready change of distributers' names as the truck is transferred from one territory to another. When the rear doors of the battery body swing open, dealers can step right into the interior of the giant battery to analyze first-hand just what happens to battery energy, etc.

Chicago Exposition of Power and Mechanical Engineering will be held October 4 to 9 at the New International Amphitheatre in Chicago, Ill. The International Exposition Co., 480 Lexington Ave., New York, N. Y., has organized the Chicago Power Show at the request of exhibitors who have for some years been urging that such an exposition be held. There is no connection between the management of this exposition and those of any previous power shows in the Chicago area. The exposition will bring to the Midwest a comprehensive exposition of machinery, apparatus, and instruments used in generation of power, its control, transmission, and use, also the most up-to-date mechanical engineering equipment designed to use power in the improvement of products and operation. Principal classifications of exhibits will include the following: combustion, electric power generation and transmission, hydraulic, control, insulation, mechanical power transmission, materials handling, plant maintenance, and prime movers, including steam, gas, oil and Diesel engines. The ability to examine competitive products conveniently, in the same location and at the same time, is one of the chief justifications for the very large audience which the Chicago Power Show anticipates.

— NEW ENGLAND —

IN GENERAL New England has seen a rather marked let down in business sentiment since March. This is attributed to the period of weakness in the stock market. In practically all lines forward buying has been but a fraction of that recorded the first quarter of the year. The shoe business is more than seasonally quiet, following a very active spring season. The textile industry, moreover, which for nearly a year had been operating close to capacity, is beginning to falter, with orders coming in comparatively slowly.

Godfrey L. Cabot, Inc., 77 Franklin St., Boston, Mass., will construct a gasoline plant in the Estes pool of West Texas to treat casinghead gas now wasting into the air from oil wells in this pool. The residue gas, after extraction of gasoline, will be piped to Wickett, Tex., and burned in an addition to Cabot's new carbon black plant at Wickett, which starts operating this month.

Phillips-Baker Rubber Co., manufacturer of rubber and canvas footwear, Providence, R. I., has announced that on account of labor difficulties its stockholders recently voted to liquidate and it is now being liquidated.

Firestone Cotton Mills, New Bedford, Mass., according to General Manager George W. Danielson, recently announced that its 1,000 employes received a 10% wage increase effective April 12.

Jean LeBras, representing the Institut Francais du Caoutchouc, of Paris, France, on an extended visit to numerous American rubber and affiliated companies, closed his general tour by spending the week of May 17 in New England. C. C. Davis, of the Boston Woven Hose & Rubber Co., Boston, Mass., arranged a number of contacts for him. On May 21 Mr. LeBras visited the laboratories of Godfrey L. Cabot, Inc., in Boston. During the week of May 24, Mr. LeBras devoted his time to short calls around New York and sailed for France June 2.

Rhode Island Rubber Club

On June 4 the Rhode Island Rubber Club will hold its spring outing at the Pawtucket, R. I., Golf Club. The golf tournament will be held in the afternoon, to be followed by dinner and talks with entertainment in the evening. There will be prizes for the tournament and door prizes for holders of the lucky numbers. Features of the entertainment include a debate between Messrs. Davidson and Comes, of the Farrel-Birmingham Co., on "Banbury vs. Mills" and "movies and talkies" on "Wild Life in New Hampshire" by a member of the New Hampshire Fish and Game Commission.

— CANADA —

Rice Studio, Ltd.

J. Glen Gay

J. Glen Gay, chief chemist, The Miner Rubber Co., Ltd., Granby, P. Q., Canada, has been elected a fellow of the Institution of the Rubber Industry, London, England. Born in Patrick, Scotland, May 25, 1902, he graduated from Glasgow University in 1923 with B.Sc. in applied chemistry and after a year as a demonstrator in chemistry went to Canada where for six months he was with the Standard Chemical Co. before joining Miner as assistant chemist. In 1925 he won his present post. Mr. Gay is a member of the Rubber Division of the American Chemical Society and an associate of the Institute of Chemistry of Great Britain and of the Canadian Institute of Chemistry. His hobby is gardening.

Industrial Accident Prevention Association, 600 Bay St., Toronto 2, Canada, recently held its 1937 safety convention attended by 1,800 delegates from 104 towns and cities, a record over the previous high figure in 1936 when 1,397 delegates registered.

At a directors' meeting of Western Ontario Division of the A. P. A. it was suggested that if executives could answer the following questions, they would have gone a long way toward the control of industrial accidents and the money loss, direct and indirect, resulting therefrom:

1. Do you know what accidents have occurred in your plant?

2. Do you know what assessments you have paid to The Workmen's Compensation Board?

3. Do you know what the Board has paid out for accidents to your employes?

4. Do you know that The Workmen's Compensation Board sends to the employer notification of every dollar paid out in connection with accidents to his employes, and how it is spent, at the same time as they send out the check?

5. Have you ever tabulated these cards to find your accident costs?

6. Do you keep together those cards and the reports of the accidents to which they refer so that you could make an analysis of the accidents?

7. Do you know why accidents happen?

8. Do you know your own accident experience?

Toronto Rubber Meeting

The Rubber Section, Toronto Chemical Association, held a meeting on April 30 in the Chemistry Building of the University of Toronto, Toronto, Ont., Canada, with an attendance of 85. W. J. R. Hauser, vice president of Heveatex Corp., Melrose, Mass., gave a very interesting talk on latex and discussed its ramifications and possibilities of application. Mr. Hauser exhibited a number of specimens which created a great amount of interest.

A nominating committee was elected to recommend officers for next season, to be voted on at the next meeting. Refreshments were served through the courtesy of L. D. Carver, chemist, Dunlop Rubber Co.

[1] Abstracts of Mr. Hauser's talk are published as an article in this issue: pages 42-45.

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(*Continued on page* 93)

Rubber Industry in Europe

GREAT BRITAIN

R. G. A. Report

The Rubber Growers' Association for 1936 reported a membership of 1,141 consisting of 506 individuals and 635 companies. Of the latter, 22 do not directly own rubber estates; the remaining 613 have a combined authorized capital of £143,100,000, of which £117,271,000 has been issued, and they own a total of 3,647,000 acres with a total area of 2,047,000 planted or interplanted with rubber. More than half the companies operate in Malaya, 99 in Ceylon, 50 in Sumatra, 49 in Java, and the rest in various other Far Eastern rubber countries.

The annual general meeting of the association was held in London on April 21. On that occasion T. J. Cummings, retiring chairman, wound up his speech with the words: "I do not think there can be any question that a renewal of the (Rubber Regulation) Scheme after 1938 is not only desirable but essential. This, however, is a matter for the International Rubber Regulation Committee, and I will content myself by saying that it is the earnest hope of all of us that their recommendation will be in favor of continuance of the Scheme."

On the subject of propaganda and research under the scheme Mr. Cummings stated that propaganda proposals providing for the establishment of separate organizations for research and propaganda and for coordinating these activities on an international basis had been laid before the R. G. A. and accepted. A uniform tax on rubber exports will be levied by the producing countries concerned to provide funds. Organizations have been established in Holland and France; a British Rubber Research Board has recently been constituted, and the formation of international committees is looked for in the near future. Eventually the propaganda and technical research work of the association and the staff handling it will be transferred to the new bodies. However the association will have its nominees on the British Rubber Research Board and the International Rubber Propaganda Committee.

In discussing the aims of the I. R. R. C. and referring particularly to the question of price, Mr. Cummings said:

"I do not think anyone will question the statement that prices during 1934, 1935, and 1936 could certainly not be said to be reasonably remunerative, even to efficient producers. It is true that the trend of price was improving, that estates were enabled to pay their European staff and native labor at a more satisfactory level than previously, and that the Governments of the producing countries received largely increased revenues, but very little was left out of the proceeds of the restricted crop to make good the arrears of work on the estates, and to pay dividends, particularly if adequate provision was for depreciation and amortization, Some companies did make a modest return to shareholders during this period, but most of them were only enabled to do so out of reserves accumulated in past years.

"It must be borne in mind that increased wages invariably result in increases in prices of other commodities and services, which in turn mean higher operating costs. The period of adjustments upward in respect of production costs requires most careful handling."

A. P. Hadow, formerly vice chairman, was elected R. G. A. chairman for the ensuing year, and J. M. Milne was appointed vice chairman.

I. R. I. Meeting

The price of rubber was also mentioned by Sir George Beharrel, president of the Institution of the Rubber Industry, at its annual meeting April 26 in London. Sir George said that what manufacturers wanted was a stable and a reasonable price. Turning to the effect of price on the expansion of the uses for rubber, he pointed out that since new rubber products competed with other materials, higher prices for crude rubber tended to hamper scientists in their efforts toward new developments. So long as prices for all materials advanced, fluctuations in rubber prices did not matter, but when there was besides artificial restriction of output, the development of the young industry was being handicapped. The International Rubber Regulation Committee, he went on, aimed at a fair working of the restriction scheme; but speculators took a hand in the game. He hoped they burned their fingers. The committee intended to see that there was an adequate supply of rubber at a reasonable price and that efficient rubber growers secured reasonable remuneration for their efforts. Sir George, it may be added, is a British representative on the advisory panel of the I. R. R. C.

The president elected for the current year was S. T. Rowe.

Notes

Bata automobile tires are to be introduced on the local market by the Cressal Tire & Rubber Co., Ltd.

At the Federation of British Industries, Westminster, an exhibition, organized by Imperial Chemical Industries, Ltd., was held the last week of April to illustrate the uses of Neoprene and Neoprene compositions. The variety of exhibits included articles for use in engineering, automobile and aircraft construction, electrical appliances, and the printing, textile, petroleum, and chemical industries.

A new company, Pendulastic, Ltd., has been formed with a capital of £10,000 in £1 shares to acquire and carry on that part of the business of Alfred Roberts & Sons, Ltd., which was devoted to bonding rubber to metal. The new concern is also to acquire from the Dartex A.G., für Kautschukverarbeitung, Frankfurt a.M., Germany, the right to manufacture and use special adhesives for bonding rubber to metal and other materials, and from another German firm, Getefo Gesellschaft für Technischen Fortschritt, the registered trade mark, "Pendulastic," besides certain patent rights and technical information regarding the design of rubber and metal devices for eliminating vibration. The new company will not only operate as rubber manufacturers and merchants, but also as electrical, mechanical, heating and ventilating, refrigeration, radio and telegraph engineers.

Dunlop in '36

In the absence of Sir Eric Geddes, who is recovering from an illness, Sir George Beharrell sat in the chair at the recent annual meeting of the Dunlop Rubber Co., Ltd. Although the new Dunlop factories abroad are now supplying several markets hitherto served from Fort Dunlop, output and sales at Fort Dunlop increased. The company is obtaining a large share of orders for airplane equipment in connection with the rearmament program. Last year proved a record for tires for agricultural vehicles and implements and for Dunlopillo. Among the novelties introduced in 1936 was a new mattress, the Deep Six, claimed to be the most luxurious on the market. A rubber wing for passenger-carrying cars, developed in 1932, is arousing great interest as it reduces maintenance costs and is expected to help promote road safety. Already over 2,500 vehi-

cles are supplied with the wing, and a substantial increase is looked for.

While output and sale of other rubber goods has improved, competition from British territories overseas continues to hamper progress. Not only Far Eastern territories are involved, but Canada too; Sir George said that Canada shipped goods to England at prices below those of the Canadian market.

As to overseas branches, the German company showed improvement, but dividends cannot be remitted. Business of the United States and Canadian companies improved, but results are still unsatisfactory. The volume and value of Dunlop business in Japan increased considerably in all lines, and profits were higher than in 1935. Tire prices there recently rose. Dunlop hopes to consolidate its position in Japan by the sale of Japanese interest of some part of the Dunlop equity in the Far Eastern company. The Dunlop Perdriau Co. of Australia is successfully emerging from a difficult period. The South African factory made a very satisfactory profit in 1936, and further expansion in productive capacity is being provided. The new India factory produced its first tire in August, 1936, and prospects for 1937 seem favorable. The factory established in the Irish Free State produces giant, car, and cycle tires, footwear and tennis balls, and is proving a useful addition to Dunlop resources.

FRANCE

French imports of crude rubber increased about 10% in 1936 as compared with 1935, 636,215 against 585,657 quintals. At the same time the value of imports of manufactured goods rose almost 27%, from 53,793,000 to 68,248,000 francs. Among the various items the sharp rise in the imports of automobile tires and tubes (36,902 quintals, value 24,236,000 francs, against 24,220 quintals, value 15,833,000 francs) is particularly remarkable as it was wholly due to the phenomenal rise in shipments from Belgium and Great Britain, purchases from practically all other countries showing steep declines. The 1936 tire shipments from Belgium alone at 23,628 quintals, against 9,197 quintals the year before, were almost as high as the total tire imports of 1935. An equally steep rise in imports occurred for rubber shoes, from 178,597 quintals, value 1,686,000 francs, to 427,856 quintals value, 4,173,000 francs. Boots over 42 cm. high came to 12,092 quintals, value 570,000 francs, against 10,444 quintals, value 401,000 francs; boots from 20 to 42 cm., dropped from 32,602 to 27,946 quintals, and bathing slippers from 9,497 to 1,097 quintals. Imports of rubber thread increased from 7,321 to 7,945 quintals, chiefly owing to larger shipments from Great Britain.

GERMANY

More on Buna Rubber

Germany is leaving nothing undone to insure the speediest possible achievement of her aim to become independent of foreign rubber. Having developed a synthetic rubber and found it good, the country's next step was to set up an organization to produce it on as large a scale as possible. Accordingly the Buna Co. was formed with a capital of 30,000,000 marks. Since private interests are not in a position to provide all the money unaided, the government has taken measures calculated to guarantee that adequate funds for all necessary buildings and equipment will be forthcoming.

Crude rubber, hitherto duty free, is now subject to an import tax, 125 marks per quintal, or something like 22¢ a pound. In other words, natural rubber is now to cost German consumers more than double the market price of the commodity. The government promises that the tax will be removed as soon as the factories have been built and equipped.

It is said that the present price of Buna is about 60% above that of the natural rubber, but efficient methods of large-scale production are expected to eliminate this difference before long so that Buna will be in a position to compete with natural rubber without the aid of subsidies or import duties.

According to a recent issue of *Gummi-Zeitung,* Buna can be reclaimed. Large-scale tests have been carried out under factory conditions with Buna S and Buna N, and high-grade reclaims are said to have been produced which are superior to ordinary rubber reclaims in regard to breaking strain and elongation. It is claimed that mixes of Buna reclaim, sulphur, and accelerator have given the following results: Buna S, breaking load, 116 kilos, and elongation 310%; Buna N, gave 183/360, 198/350, 233/430, and 204/400. After aging, the value for Buna S were 109/240 and for Buna N, 231/370 and 245/330. The reclaim process for Buna is said to be comparatively simple.

Covers for German Printing Rolls

Covers for printing rolls were first made of leather, but the difficulty of obtaining skins of uniform thickness and texture, and the resultant irregularities in the distribution of ink, led to the search for a more suitable material. Even before the World War, Dr. Werner Esch points out in an article on the subject, imitation leathers of rubber were in use. These were compounded with a gel of glue and glycerine or dregs of vegetable oils to improve their oil resistance. Other ingredients were considerable proportions of zinc white besides some magnesia usta and magnesia alba. The glue-glycerine mixes also contained 33% of chalk; while the manufacturer using dregs of oil preferred about 30% of a mineral filler called Atmido and about 10% of lamp black instead. Covers made from such mixes could be ground perfectly cylindrical and apparently served their purposes exceedingly well.

Atmido seems to have had a slightly fibrous structure; so the Atmido compounds are regarded as the forerunners of the German patents 531,775 and 568,211 which cover vulcanizates containing fibrous material of animal, vegetable, or mineral sources. However, when these patents were registered about 10 years ago, fibrous rubber compounds were new for printing rolls, although they had already been used extensively for imitation leather soles and probably for typewriter platens.

The later compounds for printing rolls differed considerably from the earlier ones; the glue-glycerine, dregs of oil, magnesia usta, and magnesia alba made place for stearic acid, the recently introduced age resisters, accelerators, and softeners; Thermax gas black came into use; while cotton linters figure among the fibrous materials. When rolls containing cotton linters were ground, the fibers were slightly exposed and at the same time curled, and this action prevented the ink from flowing off too rapidly. Such rolls soon became popular among printers, and imitations were put on the market. In one case the fiber element was supplied in the form of ground tire covers. More attention than ever is being given to the problem of making the rolls as resistant to swelling as possible.

In Germany the question of saving on imported materials has now led to the use of fine artificial fibers, as Vistra fiber, instead of cotton linters, and at present a mix for the outside cover of printing rolls reads as follows:

	Kilos
Rubber	12.250
Stearic acid	0.123
AgeRite Resin	0.245
Altax	0.245
Zimate	0.031
Vandex	0.061
Zinc white	0.613
Inactive gas black, Thermax	15.310
Vistra fibers	2.450
Velvet sulphur	0.245

Naturally such covers also come under the German patents 531,775 and 568,211 and the corresponding foreign patents.

For the cushion under the outer mix the following proved formula continues to be used:

	Kilos
Rubber	13.430
Stearic acid	0.134
AgeRite Gel	0.134
Zinc white	0.672
Vandex	0.134
Altax	0.134
Tuads	0.013
Brown factice	9.391
Iactive gas black, Thermax	0.161
Velvet sulphur	0.200

(*Continued on page 92*)

Rubber Industry in Far East

NETHERLAND INDIA

Rubber Statistics

Bulletin No. 137 of the Central Bureau of Statistics gives data on the export crops of Netherland India for 1935 and shows 1,171 rubber estates had a total area of 1,633,910 hectares. Of these, 597 with an area of 681,044 hectares were in Java, 392 with an area of 875,159 hectares in Sumatra, and 182 with an area of 77,707 hectares in the other Outer Provinces.

Of the total planted area 76% was devoted exclusively to rubber. On numerous estates other crops besides rubber are grown, and in some districts, especially in East Java, these other crops are interplanted with the rubber. Thus in Java 393 estates grow coffee, tea, cocoa, cinchona, or the like either interplanted with rubber or on separate sections. Often several of these are exploited on one estate. In Sumatra only 107 estates grow other crops besides rubber.

Of the total area of rubber estates in Netherland India 44.7% was planted, the area under rubber constituting 36.4% of the whole, so that estates have ample reserve land at their disposal, especially in Sumatra. The area under rubber in Java came to 230,162 hectares, of which 194,317 were in bearing, and in Sumatra 346,900 hectares, with 308,576 in bearing. In 1935 Java estates cut out 4,064 hectares of old rubber, and Sumatra 3,992 hectares. Of this, 2,601 hectares were replanted in the same year in Java and 2,631 hectares in Sumatra. Up to the middle of August, 1936, permits to replant 22,942 hectares during the restriction period 1934-1938 had been issued in Netherland India.

The total area under budded rubber in Netherland India was 147,850 hectares, or 25% of the total planted area. In Java 38,773 hectares, or 17% of the planted area, consisted of budded rubber, and in Sumatra 109,077 hectares, or 30% of the local planted area were budded. The greatest expansion in budding occurred during 1928-1930 when 50%, or 76,946 hectares were budded. In 1935, 2,314 hectares were budded, of which 1,436 were in Java.

During the slump period a considerable proportion of the area in bearing had been left untapped. However for estates this had fallen to 19.1% of the tappable area by June, 1934. But when restriction was introduced, the untapped area increased again and reached a peak of 39.9% at the end of December, 1935. This was in part due to the government purchase of licenses from estates to cover the excess of native rubber exports, and in succeeding months the percentage decreased somewhat again so that by June, 1936, it was 36.8%.

During 1935 estates exported 154,881 metric tons of rubber, including 59,860 tons from Java and 95,021 tons from the Outer Provinces. Native rubber exports were 144,892 metric tons.

After many ups and downs latex exports increased again in 1935. Most of the latex from Netherland India is shipped from Sumatra and in 1935 totaled 7,620 metric tons, of which about half was concentrated latex, 661 tons Revertex, and the rest chiefly about 35 to 40% latex. Java's latex exports in 1935 were only 43 tons. Exports of sprayed rubber have undergone important changes. Java, which shipped 5,090 tons in 1931 and even in 1932 managed to send 2,371 tons, sent none in 1935; while Sumatra exported 3,418 tons against 10,769 tons in 1934.

Notes

Soon after individual restriction was introduced for natives an active trade in coupons began. But recent reports from the chief native rubber centers, that is Borneo, and Palembang and Djambi in Sumatra, indicate that the prices for coupons have lately fallen 25 to 30% so that the native smallholders are turning more and more to their previous practice of tapping their rubber themselves instead of giving up their coupons.

In our April issue mention was made of plans to establish a rubber shoe factory in Jokja. Further reports indicate a factory will be erected there this year by private parties, the enterprise to receive a subsidy of 150,000 guilders. The Bata concern is in no way connected with this undertaking. Jokja was selected because it is centrally located, labor is cheap, and the local population adapted for the kind of work planned.

Some time ago we reported[1] a rubber powder factory was being erected on the Tendjo Resmi estate in South Preanger, Java, to produce rubber powder according to the Stam process. Mr. Stam himself brought the required machinery over from Holland, installed it, and directed the first operations. In fact he was to have directed work until the factory was well started; but soon after the trial running of the plant, Mr. Stam returned to Holland, for it seems that the reason for this departure was that the installation could not meet requirements. Since then many more tests have been made, and the drying towers and rubber sprayers have undergone several modifications; yet so far it has not been possible to produce real rubber powder. It is reported that the K. P. M., a steamship company, which is financially interested in the Latex Poeder Co., has sent one of its own engineers to the factory, but those in a position to know are rather skeptical of results. The factory has been closed, and it is considered that the chances of its reopening are very slim.

A Committee to Study the Working of the System of Individual Restriction of Native Rubber in the Outer Provinces has been formed to act in an advisory capacity on questions connected with the working of the restriction scheme among the natives. G. van Brakel has been appointed chairman, and the other members include A. Luytjes, G. J. Schimmel, A. W. M. Schade, and G. J. Scholte.

[1] India Rubber World, Sept. 1, 1936, p. 71.

CEYLON

100% Production?

There is much talk in Ceylon of the possibility that 100% of standard production will be permitted during the last quarter of 1937; in fact in rubber circles considered well-informed this rumor is held to be a certainty. This may be a case where the wish is father to the thought, as a strong feeling exists in favor of 100% release here. For one thing Ceylon is still smarting under what she holds to be the unfair quota allotted her, and it is urged that the present time is especially suitable for 100% release when Ceylon—and incidentally other rubber countries too—could prove her productive capacity. Ceylon is especially confident that she can produce her entire quota of 81,000 tons this year as her net exports for the first quarter were 16,567 tons, against a permissible quota of 15,188 tons, or 1,379 tons above quota. The excess, it should be noted, was obtained during the wintering period when production is always lower.

Whatever the chances for 100% release may be, leading estates are said to be arranging to increase their staff of coolies to the pre-slump level. Considerable activity is noted on estates already, for as soon as it became known

that exports for the second half of the year were to be 90%, many of the larger estates received the order to tap all out.

The higher percentage of release, by the way, is expected to stop most of the coupon trading as the incentive to buy coupons will be largely removed.

Rejuvenation vs. Replanting

A question becoming more insistent here is whether rejuvenation of old areas is wise. Doubts have already been expressed in Malaya, and lately Ceylon planters are giving this controversial matter more attention. On the one hand, some planters, with an eye on the statement in the Rubber Growers' Association report on production costs last year that must be regarded as a wasting asset with a potential economic span of only 25 to 30 years, view with alarm the disturbing fact that by the end of 1935 Ceylon's budded area was only a little over 4,000 acres against 650,000 acres in the other rubber centers, and they urge that Ceylon planters make haste to remedy the situation by availing themselves to the full of the permission to rejuvenate 20% of the planted area.

By the end of December, 1936, permits had been issued for replanting not quite 10,000 acres against the 125,000 acres Ceylon is allowed under the international agreement.

Others feel that it is by no means certain that *Hevea* has a useful life of only 25 to 30 years. Old rubber, except the poorest areas, could be maintained in a profitable condition by suitable manuring programs, they contend. One writer to a local paper, taking up this position, pointed to the heavy costs of cutting out old rubber and replanting with budded or seedling rubber, to the loss of crop until the replanted area matures, the possibility of severe disappointment in the results of planting on worn out soils.

He wound up by saying: " . . . speaking as a planter, I am skeptical as to the final results of rejuvenation, forced cultivation with plants growing in loosened soil, manured and mulched year after year, a forest tree growing under unnatural conditions; a few glamorous years, then the elements, combined with all the diseases that *Hevea* is heir to, will see the gradual breaking up of our rejuvenated clearings."

Another showed that if Malaya, Netherland India, and Ceylon cut down the permissible 20%, the total deficit in the productive area would be 1,360,000 acres. If other countries followed suit, the total areas cut out would be about 1,500,000 acres, and the consequent reduction in potential output would be around 295,000 tons. So far there does not seem to be much danger of such a deficit as Ceylon and Malaya especially have cut out only a small part of the area allowed; even Netherland India, where replanting has been much more active, has by no means utilized to the full the permission to replant. It is well to realize, however, that one of the reasons for this lag has been the shortage of funds to carry out a replanting program; and now that rubber prices are remunerative and estate finances have improved, there may be a considerable spurt in replanting, that is in so far as labor conditions permit. We have never regarded rejuvenation with much favor and hold that it would be wiser and more farseeing of the regulation committee to permit a certain amount of new planting to estates having suitable land available.

Anatomical Use of Latex

A recent issue of the *Bulletin of the Rubber Growers' Association* contains an abstract from a monograph by Dr. W. C. Osman Hill, of the Anatomy Department, Ceylon Medical College, on the use of rubber latex in anatomical procedures, which originally appeared in the *Ceylon Journal of Science* for February 10, 1937. Dr. Hill refers to work carried out in 1928 by D. R. R. Burt, of University College, Colombo, with rubber latex as an injection mass and states that for some time he has experimented also with latex in various anatomical procedures. Ammoniated latex was used. For demonstrating the vascular system of small vertebrates rubber latex is very valuable as it strengthens the vessels and allows them to return to their normal positions if disturbed during the dissection. It may be used alone or with coloring material. In cleared preparations, as an aid in demonstrating the relations of vessels, etc. to the skeleton, the use of rubber latex as an injection mass followed up by a clearing process is very valuable. In many corrosion preparations latex may be employed with advantage instead of paraffin wax. Any cavity or passage may be filled with latex and the specimen thereafter immersed in weak acetic acid. The latex is thus coagulated and may be removed by dissection or released by decalcification of surrounding bone as circumstances require. In this way accurate casts of the interior of such cavities as maxillary antrum have been made. A careful study of the internal structure of bones is possible, and a rubber "negative" of any bone can be prepared by the same method.

MALAYA

Labor Stabilization

About mid-March a serious strike broke out among Chinese estate laborers. The trouble started in Selangor, soon spread to Negri Sembilan, and had begun to make itself felt in Malacca before it was settled. Altogether about 3,000 men were out and 44 rubber estates were affected. The coolies for months had been asking for an increase in wages, which admittedly were out of proportion to the price of rubber prevailing for some time. Planters put their men off repeatedly with the explanation that the rise in price was temporary and that it would be hard to reduce wages again when prices fell. The coolies finally lost patience and struck. However, all is quiet again now that the wages of the Chinese coolies have been raised to an average of 80 Straits cents a day. At the same time the United Planting Association of Malaya decided at a meeting in Kuala Lumpur to restore wages for Tamil estate labor to the pre-slump level of 50 cents a day for men and 40 cents a day for women.

Plantation Development

Chermang Development Ltd., is rather a unique enterprise. It was started jointly several years ago by a number of rubber companies interested in budded rubber and has been planted wholly with proved clones under the most approved methods. Up to the end of December, 1936, the total expenditure on development was $465,895 (Straits currency), and it is estimated that when the entire present planted acreage reaches maturity, the total development cost (exclusive of outlay on buildings, machinery, etc.) will not exceed $350 per planted acre, which, in view of the type of material planted and the methods used, is considered low. While certain of the earliest areas are now tappable, tapping on a commercial scale has not yet been started. The quota for 1936 was 30,087 pounds, which it did not pay to harvest, and while the amount for 1937 has been fixed at 269,084 pounds, it is planned to wait until 1938 before beginning regular tapping; meanwhile, however, experimental tapping will be undertaken.

Small Holdings

The production of rubber on small holdings under 100 acres came to 131,887 tons in 1936 against 135,499 tons the year before. This lower figure was largely due to decreased tapping in the first and second quarters of 1936, especially in the Federated Malay States. The 1936 output from these states was almost 5,000 tons under the 1935 total. The Straits Settlements figure showed a decrease of about 750 tons, but the Unfederated Malay States made an increase of almost 2,000 tons. The total area out of tapping on small holdings came to 334,095 acres or 30%. The percentage of untapped rubber was lowest in Singapore, 1%, and highest in Negri Sembilan where not less than 62% of the area of 86,274 acres was out of tapping; Selangor came next with 44% out of 133,295 acres untapped. Two hundred acres were budded on small holdings in Johare.

Patents and Trade Marks

MACHINERY

United States

2,075,486. **Vulcanizer.** H. A. Van Dyke, Grove City, O.

2,075,507. **Means for Making Printing Plates.** O. B. Crowell, assignor to Viceroy Mfg. Co., Ltd., both of Toronto, Ont., Canada.

2,075,636. **Matrix.** T. C. Browne, Hinsdale, Ill.

2,075,705. **Vulcanizer.** J. C. Crowley, Cleveland Heights, assignor to Dill Mfg. Co., Cleveland, both in O.

2,076,412. **Golf Ball Mold.** J. M. Oldham, assignor to L. A. Young, both of Detroit, Mich.

2,076,565. **Ball Winding Machine.** H. N. Huse, Providence, R. I.

2,077,492. **Apparatus for Latexing Cords.** N. J. Ritzert, assignor to Dayton Rubber Mfg. Co., both of Dayton, O.

2,077,752. **Form for Inflatable Articles.** R. R. Frissell, assignor to Barr Rubber Products Co., both of Sandusky, O.

2,077,790. **Device for Printing on Curves.** I. Hakogi, Nagoya, Japan.

2,078,093. **Apparatus for Making Footwear.** J. M. Miller and A. R. Davis, both of Hudson, Mass., assignors, by mesne assignments, to United States Rubber Products, Inc., New York, N. Y.

Dominion of Canada

365,269. **Cement Sole Attaching Machine.** S. Gordy, Montreal, P. Q.

365,375. **Vulcanizing Apparatus.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of H. Willshaw, T. Norcoss, and F. G. Broadbent, co-inventors, all of Birmingham, England.

United Kingdom

455,054. **Pile Fabric Looms.** I. F. Harvey, Thornfield, and E. T. Harvey, Bradford.

455,175. **Saw Machines.** Stechschneider Ges., Berlin, Germany.

455,286. **Cable Machine.** Siemens & Halske A. G., Berlin, Germany.

455,289. **Circular Looms.** British Celanese, Ltd., London, and F. C. Hale, c/o British Celanese, Ltd., Spondon.

455,931. **Knitting Machine.** G. Blackburn & Sons, Ltd., Nottingham, and E. J. Towers, Ruddington.

Germany

644,359. **Vulcanizing Press.** Summit Mold & Machine Co., Akron, O., U. S. A. Represented by B. Kugelmann, Berlin.

644,364. **Looping Machine.** Continental Gummi-Werke A. G., Hannover.

PROCESS

United States

2,075,178. **Dispensing Device for Sheet Rubber.** L. G. Copeman, assignor to Copeman Laboratories Co., both of Flint, Mich.

2,075,189. **Crinkled Rubber.** J. J. Galligan and W. J. Robinson, both of Providence, R. I., assignors to United States Rubber Products, Inc., New York, N. Y.

2,075,835. **Coated Paper.** A. L. Spafford, assignor, by direct and mesne assignments, of one-half to Wood Conversion Co., both of Cloquet, Minn., and one-half to Paper Service Co., Cincinnati, O.

2,075,967. **Sheet Material.** M. J. Vittengl, Fairfield, Conn., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,076,079. **Milk Bottle Caps.** J. R. Gammeter, assignor of one-half to S. G. Gammeter, both of Akron, O.

2,076,270 and 2,076,271. **Covered Elastic Thread.** T. Harris, Providence, R. I., assignor to Harris Textile Machinery Corp., a corporation of R. I.

2,076,781. **Thermoplastic Compositions.** H. Jacobsen (now by judicial decree to H. Jenett), Englewood, N. J., assignor to Celanese Corp. of America, a corporation of Del.

2,076,846. **Rubber Bonded Abrasive Wheel.** P. Johanson, Boylston, assignor to Norton Co., Worcester, both in Mass.

2,076,949. **Synthetic Latex Products.** J. E. Kirby, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,077,300 and 2,077,301. **Packaging Cheese.** A. Abrams and C. L. Wagner, both of Wausau, and B. F. Davis, Arena, assignors to Marathon Paper Mills Co., Rothschild, all in Wis.

2,077,514. **Elastic Fabric.** J. T. Callahan, Waban, assigner to Archer Rubber Co., Milford, both in Mass.

2,077,617. **Rubber Products.** P. J. S. Cramer, Chesieres Lur Ollon, Switzerland, assignor to Sepat, S. A. Luxembourg.

2,077,785. **Removing Rubber from Metal.** G. B. Watkins, assignor to Libbey-Owens-Ford Glass Co., both of Toledo, O.

Dominion of Canada

365,097. **Microporous Rubber.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of E. Hazell, New York, N. Y., U. S. A.

365,367. **Rubberized Fabric.** Canadian Industries Ltd., Montreal, P. Q., assignee of E. P. Dunham and W. S. Gocher, co-inventors, both of Fairfield, Conn., U. S. A.

365,569. **Rubber Molded Article.** J. H. Coffey, Rhos-on-Sea, North Wales.

365,692. **Elastic Fabric.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of M. C. Teague, Jackson Heights, N. Y., U. S. A.

United Kingdom

440,410. **Treating Sewing Threads.** W. Hughes, Southend-on-Sea.

455,138. **Sponge Rubber.** J. A. Talalay, Bedford.

455,193. **Plastic Composition.** Soc. D'Esploitation Des Cables Electriques Systeme Berthoud, Borel & Cie, and J. Borel, both of Cortaillod, Switzerland.

Germany

643,565. **Coating Hot-Cured Rubber Articles with an Alkyd Resin Compound.** Deutsche Dunlop Gummi-Co. A. G., Hanau, a.M.

643,939. **Catheters.** Rusch A. G., Rommershausen b. Stuttgart.

CHEMICAL

United States

2,075,251. **Sulphonated Rubber Hydrohalide.** H. A. Winkelmann, Chicago, Ill., assignor to Marbon Corp., a corporation of Del.

2,075,253. **Hydrohaligenated Rubber.** H. A. Winkelmann and E. W. Moffett, both of Chicago, Ill., assignors to Marbon Corp., a corporation of Del.

2,075,254. **Sulphonated Rubber Hydrohalide.** H. A. Winkelmann, Chicago, Ill., assignor to Marbon Corp., a corporation of Del.

2,075,255. **Rubber Hydrochloride.** E. Fuelnegg, Evanston, Ill., and E. W. Moffett, Gary, Ind., assignors, by mesne assignments, to Marbon Corp., a corporation of Del.

2,075,549. **Antioxidant.** W. L. Semon, Silver Lake Village, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,076,112. **Chewing Gum.** J. O. Barker, assignor to Sweets Laboratories, Inc., both of New York, N. Y.

2,077,133. **Sulphonated Rubber.** R. L. Sibley, Nitro, W. Va., assignor, by mesne assignments, to Monsanto Chemical Co., St. Louis, Mo.

2,077,400. **Moistureproofing Composition.** J. H. Collins, Buffalo, N. Y., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,077,502. **Rubber Preservative.** I. Williams, Woodstown, and W. A. Douglass, Penns Grove, both in N. J., and A. M. Neal, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

Dominion of Canada

365,394. **Age Resister.** Wingfoot Corp., Wilmington, Del., assignee of A. M. Clifford, Stow, O., both in the U. S. A.

365,467. **Transparent Rubber Film.** Marbo Products Corp., Chicago, assignee of M. Gebauer-Fuelnegg, Evanston, both of Ill., executrix of the estate of E. Gebauer-Fuelnegg, deceased, and E. M. Katz and E. W. Moffett, both of Gary, Ind., all in the U. S. A., co-inventors with E. Gebauer-Fuelnegg, deceased.

United Kingdom

455,217. **Paints and Lacquers.** W. J. Tennant, London. (Henkel & Cie, Ges., Holthausen, Dusseldorf, Germany).

455,320. **Coloring Rubber.** Soc. of Chemical Industry in Basle, Basle, Switzerland.
455,328. **Coating Composition.** British Celanese, Ltd., London.
455,444. **Accelerators.** Wingfoot Corp., Wilmington, Del., U. S. A.
455,495. **Coating Composition.** Wingfoot Corp., Wilmington, Del., U. S. A.
455,533. **Latex Coating Composition.** G. S. May, Edinburgh, Scotland.
455,538. **Adhesive Coating Compositions.** E. Stern, London.
455,564. **Accelerators.** United States Rubber Co., New York, N. Y., assignee of L. Meuser, Naugatuck, Conn., both in the U. S. A.
455,597. **Rubber Scrap Plasticizing.** H. Voss, R. Fromm, and J. Mau, trading as Lehmann & Voss & Co., all of Hamburg, Germany.
455,641. **Coating Compositions.** Marbo Products Corp., Chicago, U. S. A.
455,644. **Accelerators.** Imperial Chemical Industries, Ltd., London, and J. G. Moore, Runcorn.
455,655. **Molding Compound.** Imperial Chemical Industries, Ltd., London.
455,674. **Rubber Coagulant,** Metallges, Akt.-Ges., Frankfurt a.M., Germany.
455,694. **Rubber Composition.** British Celanese, Ltd., and W. H. Moss, both of London.
455,735. **Latex Lubricant.** Standard Oil Development Co., Linden, N. J., U. S. A.
455,740. **Insulating Material.** Allgemeine Elektricitats Ges., Berlin, Germany.
455,762. **Pigmented Compositions.** H. A. Gardner, Northwest, Wash., U. S. A.
455,779. **Rubber Substitute.** K. W. Posnansky and C. Sandvoss, trading as Alexander & Posnansky, Dr., all of Berlin, Germany.
455,820. **Plasticizing Compounds.** Rohm & Haas Co., Philadelphia, Pa., U. S. A.

Germany

643,802. **Low Viscosity Rubber Solutions.** J. R. Geigy A. G., Basle, Switzerland. Represented by A. Kring, Berlin.
644,310. **Hardening Surfaces of Rubber Goods.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands. Represented by R. and M. M. Wirth and C. Weihe, all of Frankfurt a.M., and T. R. Koehnhorn.

GENERAL

United States

20,316 (Reissue). **Tire.** A. H. Nellen, Merion, assignor to Lee Rubber & Tire Corp., Conshohocken, both in Pa.
2,075,029. **Flush Valve.** G. C. Duncan, Jr., Los Angeles, Calif., assignor, by mesne assignments, to Duncan Noise Valve & Bowl Co., Inc., a corporation of Calif.
2,075,134. **Congratulation Card.** J. Reimann, Hamm, Germany.
2,075,229. **Foot Pad.** J. Rose, Mount Vernon, N. Y.
2,075,249. **Container Closure.** R. W. Wilson, New York, N. Y.
2,075,327. **Horticultural Tape.** A. Abrams, C. L. Wagner, and G. W. Forcey, all of Wausau, assignors to Marathon Paper Mills Co., Rothschild, all in Wis.
2,075,413. **Body Brush.** H. L. Welker, Williamsport, Pa.
2,075,432. **Shoe.** E. W. Dunbar, Hudson, assignor to Cambridge Rubber Co., Cambridge, both in Mass.
2,075,448. **Husking Roller.** W. O. Lundquist and R. W. Ma Comb, both of Cherokee, Iowa.
2,075,550. **Glove.** E. S. Smith, Ravenna, O.
2,075,577. **Syringe.** C. J. Gerhardstein, Sandusky, O.
2,075,649. **Exercising Device.** W. P. Knight, Danvers, Mass.
2,075,714. **Anchorage.** W. W. Hamill, Four Oaks, England.
2,075,760. **Ankle Protector.** R. Hesse, Pawtucket, R. I., assignor to Everlastik, Inc., Chelsea, Mass.
2,075,796. **Collapsible Bed.** R. B. Baker, Park Ridge, Ill.
2,075,945. **Rubber Sheet Material.** V. H. Hurt, Naugatuck, Conn., assignor to United States Rubber Products, Inc., New York, N. Y.
2,075,964. **Grooming Device.** A. J. Teigeler, Rutherford, N. J.
2,076,019. **Tie Plate.** A. F. Fifield, St. Catharines, Ont., Canada, assignor to American Fork & Hoe Co., Cleveland, O.
2,076,034. **Engine Mounting.** G. W. Lampman, Pontiac, assignor to General Motors Corp., Detroit, Mich.
2,076,107. **Shoe Construction.** J. J. White, assignor to Florsheim Shoe Co., both of Chicago, Ill.
2,076,122. **Floor Covering.** G. F. Duryee, assignor to Ohio Rubber Co., both of Willoughby, O.
2,076,142. **Refrigerating Device.** R. Gaschke, E. Orange, N. J.
2,076,169. **Foundation Garment.** H. Wipperman, assignor to H. W. Gossard Co., both of Chicago, Ill.
2,076,272. **Elastic Cord.** T. Harris, Providence, R. I., assignor to Harris Textile Machinery Corp., a corporation of R. I.
2,076,273. **Elastic Thread.** T. Harris, Providence, R. I., assignor to Harris Textile Machinery Corp., a corporation of R. I.
2,076,350. **Elastic Fabric.** L. Roques, assignor to L. Roques and G. Arrachequesne, all of Paris, France.
2,076,501. **Separable Fasteners.** J. L. Larroque, Rouen, France, assignor to Hookless Fastener Co., a corporation of Pa.
2,076,729. **Latex Treated Tubing.** J. A. Kennedy, Pawtucket, R. I., assignor to Anaconda Wire & Cable Co., New York, N. Y.
2,077,299. **Surgical Wrapping.** A. Abrams, C. L. Wagner, and G. W. Forcey, all of Wausau, assignors to Marathon Paper Mills Co., Rothschild, all in Wis.
2,077,396. **Moistureproof Material.** W. H. Charch, Buffalo, and A. Hershberger, Kenmore, both in N. Y., assignors, by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
2,077,453. **Therapeutical Appliance.** R. W. Albright, assignor to American Anode, Inc., both of Akron, O.
2,077,864. **Hose Coupling.** E. H. Tompkins, assignor to Scovill Mfg. Co., both of Waterbury, Conn.
2,077,998. **Multiply Latex-Treated Paper.** F. W. Humphner, Oak Park, assignor to Mid-States Gummed Paper Co., Chicago, both in Ill.
2,078,015. **Pneumatic Tire.** A. E. Perkins, Fairfield, Idaho.
2,078,059. **Handwheel Cover.** R. H. Churchill, Chicago, Ill.
2,078,141. **Inflatable Ball.** J. Hesper, Cordba, Argentina, assignor to J. Sheahin, Washington, D. C.
2,078,172. **Coated Film.** A. Abrams, G. W. Forcey, and G. J. Brabender, all of Wausau, assignors to Marathon Papers Mills Co., Rothschild, all in Wis.
2,078,184. **Bathing Trunks.** J. Russell, assignor to United Elastic Corp., both of Easthampton, Mass.

Dominion of Canada

365,011. **Shoe.** A. G. McKinnon, Montreal, P. Q., and N. L. Davis, Kitchener, Ont., co-inventors.
365,031. **Diving Dress.** Austral Submarine Inventions, Ltd., Sydney, assignee of E. R. Clifford, Five Dock, both in N. S. W., Australia.
365,067. **Braid Elastic Fabric.** Narrow Fabric Co., West Reading, assignee of O. E. Huber, Reading, both in Pa., U. S. A.
365,175. **Shoe Pad.** S. B. Hooper, Thornton Heath, England.
365,259. **Anti-Freezing Device.** R. A. Ernewin, Detroit, assignee of L. M. Beall, Dearborn, Mich., U. S. A.
365,393. **Rubber Heel Lift.** Wingfoot Corp.,Wilmington, Del., assignee of R. H. Waters and G. L. Younglof, both of Akron, O., all in the U. S. A.
365,746. **Pencil.** F. W. Haack, Berlin, Germany.
365,772. **Fountain Pen.** S. M. Sager, Glencoe, Ill., U. S. A.
365,779. **Eraser Device.** C. A. Watrous, Des Moines, Iowa, U. S. A.

United Kingdom

454,563. **Casks.** General Tire & Rubber Co., Akron, O., U. S. A., assignee of H. T. Kraft.
454,581. **Vehicle Spring Suspensions.** Daimler-Benz Akt.-Ges., Stuttgart, Germany.
454,620. **Double Windows.** P. Schwartz, Lubeck, Germany.
454,639. **Seats.** W. O. Kennington, Westminster.
454,641. **Cords.** S. P. F. Sneed, Atlanta, Ga., U. S. A.
454,669. **Knitting Pins.** C. Morfey, London. (Canfield Rubber Co., Bridgeport, Conn., U. S. A.)
454,694. **Vehicle Wheels.** Dunlop Rubber Co., Ltd., London, and C. E. Goodyear and G. E. Sharp, c/o Dunlop Rubber Co., Ltd., Coventry.
454,697. **Polishing Glass.** Lumiere & Clarte Soc. Anon Holding, Luxemburg.
454,705. **Rubber Bags.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands.
454,711. **Stopping and Regulating Teeth.** E. Singer, Vienna, Austria.
454,714. **Electric Hand Lamps.** Allmanna Svensks Elektriska Aktiebolaget, Vasteras, Sweden.
454,744. **Tires.** K. I. L. Anderson and O. G. L. Gustavsson, both of Ljusdal, and S. Kristoffersson, Mellansele, both in Sweden.
454,769. **Coated Fabrics.** G. Frenkel, Surrey.
454,773. **Vehicle Spring Suspensions.** G. H. Schieferstein, Berlin, Germany.
454,775. **Heating Liquids by Electricity.** H. Goldstein, New York, N. Y., U. S. A.
454,784. **Cleaning Poultry Cages.** A. and J. A. Proctor, Harle Syke.

454,809. **Bottle Closure Caps.** Crown Cork & Seal Co., Inc., Baltimore, Md., U. S. A.
454,825. **Tire Valves.** United States Rubber Co., New York, N. Y., U. S. A.
454,862. **Sock Suspender.** P. Pugniet, Seine, France.
454,884. **Fastenings.** J. Smith and T. B. Glentanar, both of Aboyne, Scotland.
454,892. **Saddles.** A. V. Terry, Redditch.
454,900. **Stuffing Box Packing.** Buderus'sche Eisenwerke, Wetzlar, Germany.
454,909. **Gas Generating Cartridges.** K. V. G. Wallin, Hedensberg, Sweden.
454,925. **Boot Making Machines.** British United Shoe Machinery Co., Ltd., Leicester. (United States Machinery Corp., Boston, Mass., U. S. A.)
454,936. **Vehicle Window Frames.** Accles & Pollock, Ltd., and L. B. Henderson, Birmingham.
454,962. **Sliding Clasp Fastenings.** C. F. Longmore, Birmingham, and Lightning Fasteners, Ltd., London.
455,003. **Electrically Actuated Valves.** British Thomson-Houston Co., Ltd., London.
455,011. **Ice Tray Device.** Electrolux, Ltd., Luton, assignee of Platen-Munters Refrigerating System Aktiebolag, Stockholm, Sweden.
455,027. **Stoppers.** Sharp & Dohme, Inc., Philadelphia, Pa., U. S. A.
455,067. **Kites.** A. H. Trevor, Seattle, Wash., U. S. A.
455,071. **Vacuum Cleaner Brushes.** Scott & Fetzer Co., Cleveland, O., U. S. A., assignees of L. W. Pardee.
455,099. **Respiratory Appliances.** J. A. Sadd, Porton.
455,135. **Life Buoys.** A. M. K. Saul, London, and F. L. Vaughan, Middlesex.
455,148. **Shoes.** Pirelli, Ltd., London, and G. E. Barker, Stretton.
455,154. **Trolley Poles.** Accles & Pollock, Ltd., and L. B. Henderson, Paddock Works, both of Birmingham.
455,167. **Corsets.** International Corset Co., Aurora, Ill., U. S. A.
455,170. **Footwear Protectors.** W. and M. Vorwerk, both of Wuppertal, Germany.
455,186. **Fountain Pens.** S. M. Sager, Glencoe, Ill., U. S. A.
455,203. **Trawling Nets.** M. A. Olesen, Grimsby.
455,238. **Drying Films.** A. C. Banfield and Baird Television, Ltd., both of Westminster.
455,251. **Fountain Pens.** W. A. Basting, c/o R. M. Sloman, Hamburg, Germany.
455,259. **Batteries.** C. G. Youle and S. Blakey, both of Millgate Works, Rotherham.
455,269. **Dispensing Liquids.** R. Ransom, London, and A. G. Berwick, Surrey.
455,270. **Valves.** R. Ransom, London, and A. G. Berwick, Surrey.
455,275. **Universal Joints.** V. A. Trier, Andre Works, London.
455,287. **Sterilizing Apparatus.** J. Caldwell, Olton, Warwickshire.
455,299. **Windscreen Cleaners.** J. Lucas, Ltd., and S. A. Mason, Birmingham.
455,311. **Safety Razors.** G. Taylor, Preston.
455,347. **Delivering Quantities of Liquids.** R. Ransom, London, and A. G. Berwick, Surrey.
455,350. **Seat Covers.** Medlock Mfg. Co., Ltd., Oldham, and B. J. Brown, Manchester.
455,370. **Musical Instruments.** Soc. A.R.L. Etablissements L. Pierret & Cie, Paris, France.
455,415. **Automatic Couplings.** Michelin & Cie, Puy de Dome, France.
455,429. **Mercury Electrode Cells.** I. G. Farbenindustrie A. G., Frankfurt, a.M., Germany.
455,447. **Hand Lamps.** G. A. King, Devon.
455,503. **Hats.** G. F. Farr, Luton.
455,517. **Arch Supports.** A. E. Holloway, Worthing.
455,529. **Hats.** H. H. J. Haley, London.
455,545. **Preserve Tins.** G. Scandola and Conservenfabrik St. Gallen Akt.-Ges., both of St. Gallen, Switzerland.
455,582. **Book Supports.** J. R. Isberg, Uttran, Sweden.
455,608. **Golf Clubs.** J. F. Robertson, Edinburgh, Scotland.
455,615. **Stuffing Box Substitutes.** V. A. Trier, Andre Works, London.
455,639. **Coated Webs.** A. Abbey, London. (Carborundum Co., Niagara Falls, N. Y., U. S. A.)
455,653. **Corsets.** R. T. Allis, Springfield, Mass., U. S. A.
455,660. **Toy Vehicles.** Lionel Corp., New York, N. Y., U. S. A.
455,682. **Loud Speakers.** O. Christenson, Baltimore, Md., U. S. A.
455,715. **Exhaust, Etc.** Hoover, Ltd., Greenford, assignees of D. G. Smelie.
455,830. **Tires.** A. H. Stevens, London. (General Tire & Rubber Co., Akron, O., U. S. A.)
455,834. **Vibration Dampers.** A. Rosenberger, Pforzheim, Germany.
455,855. **Exhaust, Etc.** Hoover, Ltd., Greenford. (Hoover Co., North Canton, O., U. S. A.)
455,900. **Vacuum Cleaner Agitators.** Air-Way Electric Appliance Corp., Toledo, O., U. S. A.
455,938. **Bottles.** Columbia Rope Co., Auburn, N. Y., U. S. A., assignees of K. H. Bowen.
455,946. **Milking Pails.** S. J. Marsh, Dorset.
455,950. **Vehicle Wheels.** G., G., and G. Gianetti, all of Saronno, Italy.
455,955. **Spring Suspensions.** Soc. Tubauto, Seine, France.
455,959. **Saddles.** P. Rafferty, Killaloe, Co. Clare, Irish Free State.
455,962. **Exhaust, Etc.** Hoover, Ltd., Greenford. (Hoover Co., North Canton, O., U. S. A.)
455,965. **Valves.** H. H. Schulz, and A. G. Products, Ltd., both in London.
455,988. **Motor Supports.** Manlove, Alliott & Co., Ltd., Bloomsgrove Works, and W. Gillespie, both in Nottingham.
455,992. **Batteries.** W. W. Puffett, c/o India Rubber, Gutta Percha & Telegraph Works Co., Ltd., and India Rubber, Gutta Percha, & Telegraph Works Co., Ltd., London.
455,997. **Valves.** B. Hoflinger, Berlin, Germany.
456,004. **Wall Plugs.** W. W. Hamill, Chigwell.
456,037. **Wearing Apparel.** J. Schramm, Berlin, Germany.
456,071. **Cables.** Pirelli-General Cable Works, Ltd., London, and J. L. Bishop, Southampton.
456,077. **Seats and Mattresses.** B. S. Davies and Sorbo, Ltd., both of Surrey, and H. Ambrose and Len, Ltd., both of Maidstone.
456,079. **Insoles.** E. Frei, Zurich, Switzerland.
456,172. **Electric Brooders.** J. Bee, Hambleton.
456,187. **Mounting Motors.** Borsig Maschinenbau Akt.-Ges., A. and C. Geissen, all of Berlin, Germany.
456,189. **Windscreen Cleaners.** Trico Products Corp., Buffalo, N. Y., U. S. A.
456,194. **Arch Supports.** A. W. Parfitt, London. (Excelsior Shoes, Inc., Portsmouth, O., U. S. A.)
456,198. **Batteries.** Koehler Mfg. Co., Marlboro, Mass., U. S. A.
456,200. **Tees.** M. Hornibrook, Seine Inferieure, France.
456,201. **Carpet Sweepers.** A. H. Stevens, London. (Bissell Carpet Sweeper Co., Grand Rapids, Mich., U. S. A.)
456,255. **Traveling Rugs.** J. E. Pollak, London. (Herpich Sohne, C. A., Berlin, Germany.)
456,280. **Paper Making Machines.** M. O. Neilson, Ottawa, Canada.
456,294. **Tires.** Wingfoot Corp., Wilmington, Del., U. S. A.
456,322. **Book Supports.** O. E. Petersen, Taastrup, Denmark.
456,330. **Rubber Springs.** Auto Union Akt.-Ges., Chemnitz, Germany.
456,333. **Hose Connections.** British Vacuum Cleaner & Engineering Co., Ltd., and W. J. Frame, both of London.
456,340. **Cables.** Okonite Co., Passaic, N. J., U. S. A.
456,409. **Feeding Webs.** Jagenberg-Werke Akt.-Ges., Dusseldorf, Germany.
456,427. **Printing Surfaces.** O. Clot, Seine, France.
456,454. **Resilient Supports.** P. C. A. M. D'Aubarede, Rhone, France.
456,476. **Universal Joints.** E. Bugatti, Bas-Rhin, France.
456,477. **Pencils.** I. Hersinhod, Berlin, Germany.
456,492. **Inflating Valves.** D. Hage, Hoorn, Holland.
456,495. **Motor Vehicles.** Daimler-Benz Akt.-Ges., Stuttgart, Germany.
456,497. **Undergarments.** Innes, Henderson & Co., Ltd., and T. Henderson, both of Victoria Mills, Roxburghshire, Scotland.
456,503. **Hydraulic Presses.** H. Shavinsky, London.
456,509. **Dry Pottery.** J. Wedgwood & Sons, Ltd., Stroke-on-Trent, and C. T. Wedgwood, Eccleshall.
456,524. **Hair Waver.** P. Sartory, London.
456,539. **Belt Fastenings.** H. Redfern, Manchester.
456,549. **Bathing Appliances.** P. Lyons, London.
456,559. **Tennis Appliances.** J. W. Andrew, Auburn, Victoria, Australia.
456,575. **Treatment of Growing Plants.** G. N. Bunyard, Kent.
456,580. **Liquid Fuel Burners.** F. Prizeman, Devon.
456,615. **Trusses.** J. E. Bowen, Birmingham.
456,626. **Tire Deflation Indicator.** F. Schwien, Berlin, Germany.
456,645. **Fountain Pens.** J. L. Hoyle, Hartford, Conn., U. S. A.
456,659. **Cables.** Okonite Co., Passaic, N. J., U. S. A.

456,675. **Spring Suspensions.** T. E. C. Hirst, Coventry.
456,742. **Sanding Apparatus.** L. Singleton, Bury.
456,752. **Spring Suspensions.** O. D. North, Chelsea, and P. G. Hugh and Scammell Lorries, Ltd., London.
456,787. **Suction Cleaners.** Air-Way Electric Appliance Corp., Toledo, O., U. S. A.
456,790. **Hose Pipes.** W. W. Triggs, London. (Harburger Gummiwaren-Fabrik Phoenix Akt.-Ges., Wilhelmsburg, Harburg, Germany.)
456,797. **Closet Seats.** I. Salvoni, New York, N. Y., U. S. A.
456,837. **Oscillographs.** H. Von Hartel, Berlin, Germany.
456,857. **Balls.** J. H. Parkin, Harrogate, and W. Leach, Shipley.
456,884. **Kinematograph Apparatus.** British Thompson-Houston Co., Ltd., London. (Allgemeine Elektricitats-Ges., Berlin, Germany.)
456,896. **Apparatus for Shaping Hats.** G. D. Weir, Caulfield, Victoria, Australia.
456,902. **Printing Surfaces.** B. Wale, Chicago, Ill., U. S. A.
456,908. **Cellulose Tubes.** Celluloid Corp., Newark, N. J., U. S. A.
456,948. **Inhalers.** S. G. Catt, London.
456,956. **Trunks.** K. Zejda, Prerov, Czechoslovakia.
456,984. **Vacuum Cleaners.** A. J. Holt, Middlesex.
456,985. **Grinding Tools.** W. J. Tennant, London. (Carborundum Co., Niagara Falls, N. Y., U. S. A.)
456,990. **Refrigerators.** R. Hallwood, Coventry.

Germany

642,486. **Closure for Water Bottles, Etc.** Continental Gummiwerke, A.G., Hannover.
642,669. **Rubber Cover for Heels and Soles.** H. Dresing and H. Thies, both of Wesermunde-Lehe.
642,670. **Heel and Sole.** J. Delclos-Mollera, Barcelona, Spain. Represented by G. Breitung and H. Marsch, both of Berlin.
643,494. **Tennis Balls.** Deutsche Dunlop Gummi-Co. A. G., Hanau a.M.
643,576. **Block Belt.** E. Siegling, Hannover.
643,847. **Wheel.** Eisenwerk Weserhutte A. G., Bad Oeynhausen.
644,269. Heel. Hitzler, Leonburg, Wurtt.
644,362. **Collar Button.** F. Wente, Mannheim.

TRADE MARKS

United States

343,761. **Ski-O-Twill.** Cut piece goods with elastic thread. Passaic Woolflex Mfg. Co., Paterson, N. J.
343,765. **Truflex.** Double V-shaped belts. Gates Rubber Co., Denver, Colo.
343,795. **Spine-eez.** Rubber heels. F. W. Goakes, Cleveland, O.
343,840. **Tourmure-lastik.** Foundation garments and girdles. Franco Corset Co., New York, N. Y.
343,985. **Lin Lined.** Fire hose. American Fire Hose Co., Philadelphia, Pa.
343,993. **S R O.** Oil for processing and treating rubber. Barrett Co., New York, N. Y.
344,046. **Conforma.** Sanitary belts. I. B. Kleinert Rubber Co., New York, N. Y.
344,049. **Cenex.** Compositions consisting largely of concentrated rubber latex. United States Rubber Products, Inc., New York, N. Y.
344,050. **Penguin.** Raincoats. United States Rubber Products, Inc., New York, N. Y.
344,056. **Fannyette.** Seat cushions. Virginia Rubbertex Corp., Bedford, Va.
344,059. **Marbon.** Adhesives. Marbon Corp., Chicago, Ill.
344,066. **Tres Secrete.** Corsets, girdles, etc. La Resista Corset Co., Bridgeport, Conn.
344,276. Representation of a spool of elastic yarn and the word: **"Filatex"** underneath. Elastic yarn. Filatex Corp., New York, N. Y.
344,329. Representation of an elephant. Golf balls. Frank H. Cavignac-Associates, Glendale, L. I., N. Y.
344,407. **Ever-Nu.** Liquid rubber cleanser and renewer. A. M. Ladd, doing business as Ever-Nu Laboratories, Los Angeles, Calif.
344,423. **Kaysam.** Erasers. Rubber-Gel Products Corp., N. Quincy, Mass.
344,446. **Nursrite.** Nipples. Cilcoon Corp., Detroit, Mich.
344,519. Representation of a crown and the words: **"Golden Crown"** underneath. Tennis racquets and balls. Walgreen Co., Chicago, Ill.
344,546. **Lubrex.** Mold lubricant. C. J. Harwick, doing business as Standard Chemical Co., both of Akron, O.
344,615. **Femi-care.** Druggists' sundries. J. A. Kirk, Detroit, Mich.
344,663. **Essar.** Crude rubber. H. Muehlstein & Co., Inc., New York, N. Y.
344,706. **Cog Belt.** V-type belts. Dayton Rubber Mfg. Co., Dayton, O.
345,036. **Santoflex.** Antioxidants. Monsanto Chemical Co., St. Louis, Mo.
345,043. Spool of elastic yarn forming the word **"Filatex"** underneath. Elastic threads. Filatex Corp., New York, N. Y.
345,114. **Y K L.** Tires. Goodyear Tire & Rubber Co., Akron, O.
345,115. **Rayotwist.** Tires. Goodyear Tire & Rubber Co., Akron, O.
345,165. **General Allgrip.** Tires. General Tire & Rubber Co., Akron, O.
345,253. **Orthotex.** Liquid latex for chiropodists. E. C. Meldman, Milwaukee, Wis.

NEW PUBLICATIONS

(*Continued from page* 60)

ards). National Safety Council, 20 North Wacker Drive, Chicago, Ill. This 16-page pamphlet, a compilation of experience in accident prevention, is the first of a series of pamphlets being published on the subject groups: A. Accelerators, Antioxidants, and Dry Organic Compounds; B. Dry Inorganic Compounds; C. Gums, Resinous Materials, and Waxes; D. Liquids and Bases. In addition to the listing in four groups according to their toxicity, this pamphlet presents an alphabetical classification in which the compound or chemical is described as to: 1. origin, identification, and chemical characteristics; 2. general use in the industry; 3. health hazards and any suggestions, if necessary, to reduce or eliminate such hazards. This pamphlet is a revision of an original pamphlet prepared from a paper given by L. J. D. Healy, then technical superintendent of The Fisk Rubber Co., Cudahy, Wis., before the Rubber Section during the Sixteenth Annual Safety Congress (1927). In December, 1929, INDIA RUBBER WORLD published the listing according to toxicity covering the greater portion of the materials included in this pamphlet.

BOOK REVIEWS

"Proceedings of the Thirty-ninth Annual Meeting of the A.S.T.M. Held at Atlantic City, N. J., June 29 to July 3, 1936." Vol. 36. American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa. Illustrated with subject and author indices. Each part costs: $5.50 in stiff paper cover; $6 cloth; and $7 half leather.

Part I (1,245 pages) contains the reports of 45 standing committees and includes 115 tentative specifications and test methods. There are extensive reports on ferrous and non-ferrous metals as well as ceramic and concrete materials. Some of the reports deal with rubber products for friction tapes and insulated wire. Other reports cover accelerated aging, adhesives, tension testing, and compression set of vulcanized rubber.

Part II (846 pages) contains the eleventh Edgar Marburg lecture by Arthur L. Day on "Developing American Glass" and 50 technical papers with extensive discussions following each paper. There are five papers given in the "Symposium on the Limitation of Laboratory and Service Tests in Evaluating Rubber Products." These papers deal with tires, footwear, automotive rubber parts, belts and hose, and insulated wire and cables. Several papers on the subject of boiler feed water are included. There is also an extensive treatise on methods of determining gloss in connection with various types of materials and an article on the testing of organic finishes.

"Custom House Guide." 75th Annual Edition. Custom House Guide, Box 7, Station P, Custom House, New York, N. Y. Price $15.

Because of the inclusion of the new rates of duty established under the fifteen reciprocal trade agreements which have been concluded by the United States with foreign nations and of the many revisions enacted by Congress, the new volume is completely revised this year. The alphabetical index of 30,000 commodities has been entirely revised. Opposite each commodity are the new rates of duty.

In the Tariff Act of 1930, included in the new edition, a reference note showing the reciprocal trade agreement, has

(*Continued on page* 93)

Market Reviews

CRUDE RUBBER

Commodity Exchange

TABULATED WEEK-END CLOSING PRICES

Futures	Mar. 27	May 1	May 8	May 15	May 22
Apr.	26.27	.....	.....	.....	.....
May	.....	20.94	22.45	20.85	21.03
June	.....	21.01	22.53	20.93	21.08
July	26.36	21.09	22.60	21.00	21.13
Sept.	26.27	21.17	22.74	21.10	21.28
Dec.	26.27	21.19	22.80	21.15	21.38
Mar.	.....	21.19	22.80	21.19	21.45
Apr.	.....	21.19	22.80	21.19	21.45
Volume per week (tons)	22,840	40,690	17,050	24,910	11,670

New York Quotations

New York outside market rubber quotations in cents per pound

Plantations	May 27, 1936	Apr. 27, 1937	May 27, 1937
Rubber latex...*gal.*	59/60	79/80	75/76
Paras			
Upriver fine	17¼	22¾	20¾
Upriver fine	*21¾	*28	*26¾
Upriver coarse	11½	14½	14½
Upriver coarse	*16¾	*22¾	*21
Islands fine	18	22	20½
Islands fine	*21¾	*27¾	*26
Acre, Bolivian fine	17½	23	21¼
Acre, Bolivian fine	*21¾	*28½	*27
Beni, Bolivian fine	18½	23½	22
Madeira fine	17¼	22¾	21¼
Caucho			
Upper ball	11½	14	14½
Upper ball	*16½	*22½	*21
Lower ball	11¾	13¾	14
Pontianak			
Bandjermasin	6	7	9
Pressed block	12	11/30	10½/30
Sarawak	6	..	9
Guayule			
Duro, washed and dried	13	16	16½
Ampar	13½	17½	17
Africans			
Rio Nuñez	14½	21	17
Black Kassai	14½	21	17
Prime Niger flake	27	28	28
Gutta Percha			
Gutta Siak	11	11	10½
Gutta Soh	14	15	16¾
Red Macassar	1.25	1.00/1.05	1.10
Balata			
Block, Ciudad Bolivar	30	32	32
Manaos block	27	28	27
Surinam sheets	33	35	38
Amber	36	38	42

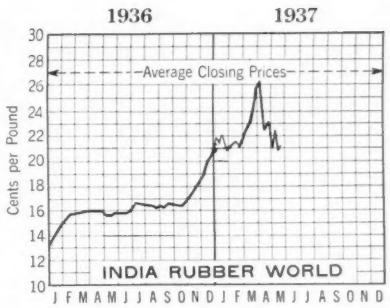
*Washed and dried crepe. Shipments from Brazil.

IN THE Commodity Exchange table are shown prices of representative future contracts on the New York market during the past two months.

Since April 24 the market activity has been rather slow, with prices fluctuating within narrow margins during May. On April 24 the price for July delivery was 23.35¢ per pound; on May 1, 21.09¢; on May 8, 22.60¢; on May 15, 21¢; and on May 22, 21.13¢ per pound. Prices for delivery throughout the year showed a variation of only 0.42¢ as a maximum.

If the German tax of 125 marks per 200 pounds, or roughly 22¼¢ per pound, becomes actually effective, it should serve to cut down imports to Germany and release some tonnage of crude for other countries. However this hardly seems reasonable, for the tax is expected to foster the use of local synthetic rubber of which the anticipated German production is 1,500 tons; whereas reports indicate that in 1936 Germany imported 71,793 tons and during the first quarter of 1937 she imported 22,620 tons, which is at the yearly rate of over 90,000 tons.

According to figures released by The Rubber Manufacturers Association, Inc., consumption of crude rubber in the United States during April is estimated at 51,797 long tons, 4.2% under the 54,064 (revised) long tons for March and less than 1% under the consumption of 52,031 long tons in April, 1936. Gross imports of crude for April were 35,850 long tons, a decrease of 31.1% under the 52,039 long tons imported during March and 11.2% under the April, 1936, figure of 40,770 long tons. The R. M. A. estimates total domestic stocks of crude rubber on hand April 30 at 174,934 long tons, against 191,928 (revised) long tons on March 31 and 277,478 (revised) long tons on hand April 30, 1936. Crude rubber afloat to United States as of April 30 is estimated to be 72,530 long tons as compared with 56,994 long tons afloat on March 31 and 47,678 long tons on April 30, 1936.



New York Outside Market—Spot Ribbed Smoked Sheets

The amount of reclaimed rubber consumed during April is estimated at 14,806 long tons, or over 28% of the crude rubber consumption; while the reclaimed rubber production in April is figured at 13,884 long tons, and the stock on hand April 30 is put at 17,117 long tons, or only slightly more than one month's consumption.

New York Outside Market

Factory buying has been very slow throughout May to date. No. 1 ribbed smoked sheets dropped from 22⅛¢ per pound on April 26 to 20⅞ on April 29; went back up to 22½¢ on May 8, and back to 20⅞¢ May 13. Consumption was steady in May without any particularly significant fluctuation.

The week-end closing prices on No. 1 smoked ribbed sheets follow: May 1, 21¢; May 8, 22½¢; May 15, 20⅞¢; and May 22, 21⅛¢ per pound.

NATIONAL SAFETY COUNCIL REPORTED traffic accident death totals reduced an average of over 8% in 1936 by 16 states, the District of Columbia, and 116 cities of over 10,000 population outside those states.

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	April, 1937					May, 1937																		
	26	27	28	29	30	1	3	4	5	6	7	8	10	11	12	13	14	15	17	18	19	20	21	22
No. 1 Ribbed Smoked Sheet	22⅛	22¼	20⅞	20⅞	21⅛	21	21	21⅛	21½	21⅝	21⅞	22½	21½	21⅝	21½	20⅞	20⅞	20⅞	20⅞	20⅞	20⅞	20⅞	21⅛	21⅛
No. 2 Ribbed Smoked Sheet	22	22⅛	20⅞	20¾	21	20⅞	20⅞	21⅛	21⅜	21⅝	21⅞	22⅜	21⅜	21½	21⅜	20¾	20⅞	20⅞	20⅞	20⅛	20⅞	20⅞	20⅞	20⅞
No. 3 Ribbed Smoked Sheet	21⅞	22	20⅞	20⅝	20⅞	20¾	20¾	21⅛	21¼	21⅛	21⅝	22¼	21¼	21⅜	21¼	20⅝	20⅞	20⅞	20⅛	20⅛	20⅞	20⅞	20⅞	20⅞
No. 4 Ribbed Smoked Sheet	21⅝	21⅝	20⅝	20⅛	20⅝	20⅛	20⅛	20⅝	21⅛	21⅛	21⅛	22⅛	21⅜	21¼	21⅛	20½	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛
No. 1 Thin Latex Crepe	25⅜	25½	25	24⅞	25	25	25	25⅛	25½	26	26⅛	26½	26	26	26	25½	25½	25½	25⅜	26	26¼	26¼	26¼	26¼
No. 1 Thick Latex Crepe	25⅜	25½	25	24⅞	25	25	25	25⅛	25½	26	26⅛	26½	26	26	26	25½	25½	25½	25⅜	26	26¼	26¼	26¼	26¼
No. 1 Brown Crepe	21½	21⅝	20⅛	20¼	20½	20⅜	20⅜	20⅝	20⅞	21⅛	21⅛	21⅜	20⅞	21	20⅞	20¼	20⅛	20⅛	20⅛	20⅛	20⅜	20⅜	20½	20½
No. 2 Brown Crepe	21⅜	21½	20⅛	20⅜	20⅜	20¼	20¼	20⅛	20¾	21⅛	21⅛	21¾	20¾	20⅞	20¾	20⅜	20⅛	20⅛	20⅛	20	20¼	20¼	20⅜	20⅜
No. 2 Amber	21½	21⅝	20⅛	20¼	20½	20⅜	20⅜	20⅝	20⅞	21⅛	21⅛	21⅜	20⅞	21	20⅞	20¼	20⅛	20⅛	20⅛	20⅛	20⅜	20⅜	20½	20½
No. 3 Amber	21⅜	21½	20⅛	20⅜	20⅜	20¼	20¼	20⅛	20¾	21⅛	21⅛	21¾	20¾	20⅞	20¾	20⅜	20⅛	20⅛	20⅛	20	20¼	20¼	20⅜	20⅜
No. 4 Amber	21⅛	21¼	20	19⅞	20⅛	20	20	20⅛	20½	20⅝	20⅝	21½	20½	20⅝	20½	19⅞	19⅝	19⅝	19⅝	19¾	20	20	20⅛	20⅛
Rolled Brown	20⅜	20½	19¼	19⅛	19⅜	19¼	19¼	19⅛	19¾	20⅛	20⅛	20½	19½	19⅞	19¾	19⅛	19⅛	19⅛	19⅛	19	19¼	19¼	19⅜	19⅜

IMPORTS, CONSUMPTION, AND STOCKS

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Imports* Tons	U. S. Consumption¶ Tons	U. S. Stocks Mfgrs. Importers, Dealers, Etc.† Tons	U. S. Stocks Afloat† Tons	U. K.— Public Warehouses, London, Liverpool†‡ Tons	Singapore and Penang Dealers and Port Stocks†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks†‡§ Tons
1934	469,484	453,223	355,000	47,644	134,927	62,142	1,019,200	924,141	729,391
1935	448,116	491,544	303,000	39,094	164,295	28,304	872,800	938,489	634,170
1936	490,858	575,000	223,000	56,567	78,462	26,969	855,923	1,039,216	455,409
1936									
January ...	31,292	48,631	296,683	43,870	162,107	31,195	62,726	**83,993	569,826
February ..	35,219	36,841	293,631	46,532	157,028	38,421	64,019	68,635	572,323
March	37,451	42,813	284,561	58,935	147,712	29,322	69,252	80,132	590,475
April	40,370	52,031	277,478	47,678	140,404	32,200	60,030	85,336	527,178
May	35,598	50,612	262,415	48,860	130,590	26,687	68,838	90,090	501,582
June	41,835	52,772	245,544	47,228	122,285	28,260	66,478	87,830	532,992
July	35,880	48,250	235,850	60,343	113,386	29,493	83,850	86,698	490,074
August ...	42,562	46,777	230,167	63,597	108,215	28,289	71,213	81,378	468,238
September.	48,386	46,449	233,336	62,240	103,962	26,936	72,314	82,288	490,602
October ...	40,920	49,637	224,000	67,825	96,625	24,593	81,756	91,602	450,560
November..	44,296	50,433	211,480	73,691	88,781	26,761	78,355	88,742	436,657
December..	57,049	49,753	223,000	56,567	78,462	26,969	77,092	92,289	455,409
1937									
January ...	32,820	50,818	204,201	55,096	71,062	36,365	71,548	90,364	412,404
February .	43,289	51,887	195,080	53,538	63,760	42,132	70,538	91,509	398,369
March	52,039	54,064	191,928	56,994	52,077	42,485	102,087	102,227	437,431
April	35,850	51,797	174,934	72,530					

*Including liquid latex. †Stocks on hand the last of the month or year. ‡Statistical Bulletin of the International Rubber Regulation Committee. §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos, and afloat. ¶Corrected to 100% from estimate of reported coverage. **Not including additional absorption from U.K. manufacturers stocks for any month during 1936. The figure will be included in yearly total.

CRUDE rubber consumption by United States manufacturers for April is set at 51,797 long tons, against 54,064 (revised) long tons for March. April consumption shows a decrease of 4.2% under March and is less than 1% under the April, 1936, figure of 52,031 (revised) long tons, according to R. M. A. statistics.

Gross crude rubber imports for April are estimated at 35,850 long tons, 31.1% under the March figure of 52,039 long tons and 11.2% under the 40,370 long tons imported in April, 1936.

Total domestic stocks of crude rubber on hand April 30 are figured at 174,934 long tons, compared with March 31 stocks of 191,928 (revised) long tons and 277,478 (revised) long tons on hand April 30, 1936.

Crude rubber afloat to United States ports as of April 30 is estimated to be 72,530 long tons, against 56,994 long tons afloat on March 31 and 47,678 long tons afloat April 30, 1936.

London and Liverpool Stocks

Week Ended	London Tons	Liverpool Tons
Apr. 24.....	21,383*	27,445*
May 1.....	21,154	27,533
May 8.....	21,405	26,352
May 15.....	21,336	25,862
May 22.....	21,602	25,333
May 29.....	21,467	25,220

*Corrected.

Tire Production Statistics

	Inventory	Production	Total Shipments
Pneumatic Casings—All Types			
1934	9,454,985	47,232,748	46,686,545
1935	8,195,863	49,361,781	50,183,129
1936	11,114,399	58,116,349	55,362,739
1937			
Jan.	11,377,015	4,980,174	4,509,240
Feb.	12,307,681	5,245,894	4,370,630
Inner Tubes—All Types			
1934	9,179,893	46,227,807	45,045,495
1935	8,231,351	47,879,034	48,066,904
1936	10,985,273	57,247,554	54,624,321
1937			
Jan.	11,100,094	4,801,186	4,390,960
Feb.	11,733,525	5,090,504	4,536,354
Industrial Pneumatic and Solid Truck, Tractor, and Trailer Tires			
1934	16,397	197,497	187,152
1935	20,315	283,606	275,741
1936	32,694	389,240	385,164
1937			
Jan.	47,020	37,979	40,421
Feb.	.....	42,716	40,924
Solid and Cushions for Highway Transportation			
1934	13,574	*	*
1935	11,266	*	*
1936	8,908	*	*
1934			
Jan.	5,680	1,385	1,673
Feb.	....	1,507	1,472

	Cotton and Rubber Consumption Casings, Tubes, Solid and Cushion Tires		Consumption of Motor Gasoline (100%) Gallons
	Cotton Fabric Pounds	Crude Rubber Pounds	
1934...	196,069,495	697,558,218	17,063,298,000
1935...	202,318,119	756,773,779	18,167,352,000
1936...	199,546,100	754,301,443	20,242,782,000
1937			
Jan....	17,987,663	66,728,092	1,415,232,000
Feb....	18,975,305	67,185,852	1,344,000,000

Rubber Manufacturers Association, Inc., figures have been adjusted to represent 100% of the industry based on reports received which represent 97% for 1934-1935 and 81% for 1936-1937.

**Figures for years 1934, 1935, and 1936 included under Industrial Pneumatic and Solid Truck, Tractor, and Trailer Tires.*

Incorporated Glue in Rubber Mixes

IT HAS for some years now been recognized, says Marcel Faidutti,[3] that the addition of glue to rubber mixes confers certain advantages, as: increased resistance to alcohols and solvents, better resistance to abrasion, and greater rigidity in vulcanized rubber; while added to latex, the glue acts as thickener, stabilizer, and deflocculent.

While the addition of glue to latex is simple enough, difficulties arise when it is to be incorporated into rubber mixes. Usually the mixing of milled rubber and glue is effected on hot rolls, the glue having first been allowed to swell in water, or being added in the form of a thick syrup to which glycerine may or may not have been added, or again powdered or in tablet form. If glue with a fairly large amount of water is employed, dispersion is satisfactory enough, but the operation is very unpleasant. On the other hand, if glue with a minimum of water is used, the work is less disagreeable, but the dispersion leaves much to be desired.

Below is Mr. Faidutti's method of incorporating glue in rubber by which he claims the above difficulties are obviated.

First 100 grams of strong glue are allowed to swell 24 hours in 100 grams of water; then it is melted by heating over a hot water bath. With the mixture still over the hot bath, 10 centimeters of ammonia at 22° Bé. are added; then 166 grams of 60% latex are poured into the liquid glue while being stirred. After a homogeneous mixture is obtained, it is poured into a shallow mold and allowed to cool. After unmolding and drying, a horny product results which can easily be incorporated into rubber on an ordinary mixer. Dispersion is excellent and very easily effected. This process can, of course, be modified so as to yield a product with different proportions of rubber and glue. The above formula gives a product with 50% of rubber and 50% of glue. The ammonia may be omitted. In this case a few lumps of coagulated rubber may appear, but this does not affect the rest of the procedure.

Mr. Faidutti has been using this method since April, 1935, for making test mixes at the laboratory of the

(*Continued on page 93*)

[3] *Rev. gén. caoutchouc*, Dec., 1936, p. 24.

HOW WELL ARE YOU HANDLING

the Reclaim and Smoked Sheet Odor Problem?

As the cost of rubber rises many compounders are replacing pale crepe with reclaim and smoked sheets in greater and greater quantities. If you are among them you are aware of the difficult odor problem this situation presents.

GIVAUDAN
has recently developed
PARA-DORS

to overcome—economically and effectively—the odor of reclaim and smoked sheets. Their cost is low. They do the job at top efficiency. Our staff can give you experienced cooperation. Write, wire or phone for samples and further information.

GIVAUDAN
DELAWANNA, INC.
Industrial Aromatics Division
80 Fifth Avenue, New York, N. Y.

Regular and Special Constructions
of
COTTON FABRICS

Single Filling Double Filling
and
ARMY
Ducks

HOSE and BELTING
Ducks

Drills

Selected
Osnaburgs

Curran & Barry
320 BROADWAY
NEW YORK

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Mar. 27	May 1	May 8	May 15	May 22
Apr.	14.22	.....	.....	.....	.....
May	.....	12.88	13.03	.....	.....
June	.....	12.89	13.05	12.71	12.79
July	13.96	12.91	13.08	12.76	12.84
Sept.	13.64	12.75	12.94	12.64	12.80
Dec.	13.45	12.65	12.84	12.56	12.75
Mar.	.....	12.69	12.91	12.63	12.82
Apr.	.....	.....	.....	.....	12.84

New York Quotations

May 27, 1937

Drills

38-inch 2.00-yard	yd.	$0.17⅞
40-inch 3.47-yard		.10
50-inch 1.52-yard		.23½
52-inch 1.85-yard		.19½
52-inch 1.90-yard		.18½
52-inch 2.20-yard		.17½
52-inch 2.50-yard		.15¾
59-inch 1.85-yard		.19

Ducks

38-inch 2.00-yard D. F.	yd.	.16 /.17
40-inch 1.45-yard S. F.		.23½
51½-inch 1.35-yard D. F.		.23¾
72-inch 1.05-yard D. F.		.31¾/.32⅞
72-inch 17.21-ounce		.36½

MECHANICALS

Hose and belting	lb.	.32½

TENNIS

52-inch 1.35-yard	yd.	.26

Hollands

GOLD SEAL AND EAGLE

20-inch No. 72	yd.	.11
30-inch No. 72		.20
40-inch No. 72		.22

RED SEAL AND CARDINAL

20-inch	yd.	.09⅝
30-inch		.18
40-inch		.19¼
50-inch		.27

Osnaburgs

40-inch 2.34-yard	yd.	.12¾/.14¼
40-inch 2.48-yard		.12⅛/.14
40-inch 2.56-yard		.11¾
40-inch 3.00-yard		.11⅜
40-inch 7-ounce part waste		.11¾
40-inch 10-ounce part waste		.16⅛
37-inch 2.42-yard		.14¼

Raincoat Fabrics

COTTON

Bombazine 60 x 64	yd.	.10½
Plaids 60 x 48		.12
Surface prints 60 x 64		.13¼
Print cloth, 38½-inch, 60 x 64		.08

SHEETINGS, 40-INCH

48 x 48, 2.50-yard	yd.	.12½
64 x 68, 3.15-yard		.11⅞
56 x 60, 3.60-yard		.10
44 x 40, 4.25-yard		.08

SHEETINGS, 36-INCH

48 x 48, 5.00-yard	yd.	.07¼
44 x 40, 6.15-yard		.05¾

Tire Fabrics

BUILDER

17¼ ounce 60" 23/11 ply Karded peeler	lb.	.36½

CHAFER

14 ounce 60" 20/8 ply Karded peeler	lb.	.36½
9¼ ounce 60" 10/2 ply Karded peeler	lb.	.36

CORD FABRICS

23/3/3 Karded peeler, 1 1/32" cotton	lb.	.39½
15/3/3 Karded peeler, 1 1/32" cotton	lb.	.36½
23/5/3 Karded peeler, 1¼" cotton	lb.	.46
23/5/3 Combed Egyptian	lb.	.56

LENO BREAKER

8½ ounce and 10¼ ounce 60" Karded peeler	lb.	.38½

THE accompanying table of week-end closing prices on the New York Cotton Exchange shows the week-end change of representative futures during May and the month-end prices for March and April. Spot middlings held close to 13.50¢ per pound from May 1 to 22 in comparison with 13.85¢ on April 20. Up to May 22 the lowest price was 13.12¢ on May 13 and the highest was 13.65¢ on May 6.

Total sales at 13 southern markets during 19 days in May were 40,399 bales as compared with 184,777 bales for the same days in 1936. Average prices at 10 designated southern markets trailed the New York middlings prices at from 21 to 23¢ per pound.

On April 29 the Commodity Credit Corp. announced that its marketing program for 12¢ loan cotton will be continued, for the time being under the same conditions which have existed heretofore.

The government reported cotton consumption by domestic mills during April of 719,000 bales, the largest for any month on record with the single exception of March, which showed 779,000 bales were used. In April, 1936, the mill consumption was 577,000 bales. Consumption for the first nine months of the cotton season totaled 6,010,883 bales, an all-time record. The world crop of commercial cotton this season is estimated by some to be approximately 29,900,000 bales consisting of roughly 12,300,000 bales of American and 17,600,000 bales of foreign growths.

More frequently shutdowns of fabricating mills appear to be the trend. It is expected that the acreage planted this season will be approximately 10% higher than during last season.

Fabrics

Cotton textile mills are exceptionally busy on backlog orders, and in general they probably will continue so during the summer. The demand for forward delivery appears to have been halted by conditions seemingly outside of cotton textiles. New business seems to have fallen off. While there has been some slight variation from April 27 prices, in general the fabrics have not suffered appreciably, but unless the cloth markets reconstitute themselves during the next two months, prices are likely to take their trend from raw material issuing from the cotton crop currently in growth. Cotton prices receded somewhat, but as yet the fabrics do not appear to be materially affected. During the closing days of May more interest appeared in the fabric market. Owing to the indefiniteness as to future action toward governmental control over cotton growing and the possibility of continuous operation of fabric mills, it is impossible at this time to estimate the future situation relative to supply and demand.

RUBBER SCRAP

THE market for all grades of rubber scrap continued very active as reclaimers are extremely busy. The supply is low in comparison with the demand. Prices increased on some grades. No. 1 floating inner tubes went up 1¢ per pound; No. 2 compound tubes ⅛¢; Red and mixed tubes ¼¢. Auto tire carcass increased $2.50 per ton; black auto peelings, $1.50; and light gravity solid tires $6.00. Mechanical scrap No. 1 red increased ½¢ per pound. Other types are unchanged.

CONSUMERS' BUYING PRICES

(Carload Lots Delivered Eastern Mills)

May 27, 1937

Boots and Shoes		Prices
Boots and shoes, black	lb.	$0.01¼/$0.01⅜
Colored	lb.	.00⅞/ .01
Untrimmed arctics	lb.	.01 / .01⅛
Inner Tubes		
No. 1, floating	lb.	.14½/ .15
No. 2, compound	lb.	.06¾/ .06⅞
Red	lb.	.06¾/ .06⅞
Mixed tubes	lb.	.06 / .06⅛
Tires (Akron District)		
Pneumatic Standard		
Mixed auto tires with beads	ton	16.50 /17.00
Beadless	ton	23.50 /24.00
Auto tire carcass	ton	30.00 /33.00
Black auto peelings	ton	24.00 /26.00
Solid		
Clean mixed truck	ton	32.50 /35.00
Light gravity	ton	42.00 /45.00
Mechanicals		
Mixed black scrap	ton	25.00 /30.00
Hose, air brake	ton	31.00 /33.00
Garden, rubber covered	ton	16.50 /18.00
Steam and water, soft	ton	16.50 /18.00
No. 1 red	lb.	.04¾/ .04½
No. 2 red	lb.	.03 / .03¼
White druggists' sundries	lb.	.04¾/ .05
Mechanical	lb.	.04½/ .04⅞
Hard Rubber		
No. 1 hard rubber	lb.	.15 / .17

British Malaya

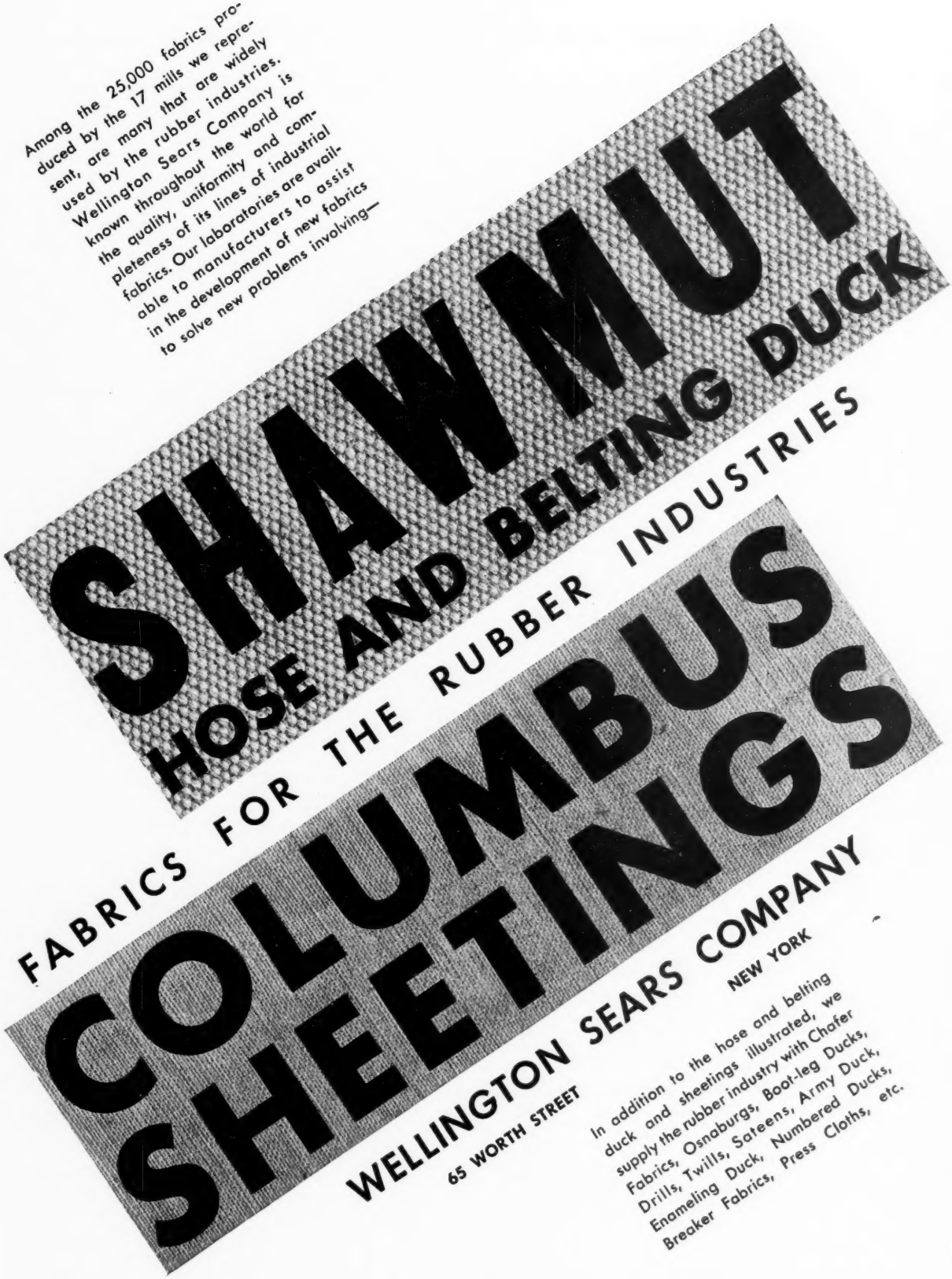
An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Trafalgar Sq., London, W.C.2, England, gives the following figures for April, 1937:

Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

To	Sheet and Crepe Rubber Tons	Latex, Concentrated Latex, Revertex, and Other Forms of Latex Tons
United Kingdom	4,616	394
United States	31,626	787
Continent of Europe	11,936	533
British possessions	3,160	37
Japan	4,829	37
Other countries	759	4
Totals	56,926	1,792

Rubber Imports: Actual, by Land and Sea

From	Dry Rubber Tons	Wet Rubber (Dry Weight) Tons
Sumatra	6,233	1,760
Dutch Borneo	2,219	242
Java and other Dutch islands	558	9
Sarawak	2,948	..
British Borneo	288	32
Burma	396	8
Siam	1,708	395
French Indo-China	120	142
Other countries	72	6
Totals	14,542	2,594


Among the 25,000 fabrics produced by the 17 mills we represent, are many that are widely used by the rubber industries. Wellington Sears Company is known throughout the world for the quality, uniformity and completeness of its lines of industrial fabrics. Our laboratories are available to manufacturers to assist in the development of new fabrics to solve new problems involving—
SHAWMUT
HOSE AND BELTING DUCK
FABRICS FOR THE RUBBER INDUSTRIES
COLUMBUS SHEETINGS
WELLINGTON SEARS COMPANY
65 WORTH STREET
NEW YORK
In addition to the hose and belting duck and sheetings illustrated, we supply the rubber industry with Chafer Fabrics, Osnaburgs, Boot-leg Ducks, Drills, Twills, Sateens, Army Duck, Enameling Duck, Numbered Ducks, Breaker Fabrics, Press Cloths, etc.

RECLAIMED RUBBER

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption†	Consumption % to Crude	U. S. Stocks*	Exports
1934	110,010	100,597	22.3	23,079	4,737
1935	122,140	113,530	22.9	25,069	5,383
1936	150,571	133,000	23.1	19,000	7,085
1937					
January	15,129	13,709	27.0	19,563	857
February	15,192	13,831	26.7	19,978	946
March	14,462	14,801	27.4	18,839	901
April	13,884	14,806	28.6	17,117	...

*Stocks on hand the last of the month or year. †Corrected to 100% from estimate of reported coverage.
Compiled by The Rubber Manufacturers Association, Inc.

New York Quotations

May 27, 1937

	Sp. Grav.	¢ per Lb.
Auto Tire		
Black Select	1.16-1.18	6½/ 6¾
Acid	1.18-1.22	7½/ 7¾
Shoe		
Standard	1.56-1.60	7½/ 7¾
Tube		
No. 1 Floating	1.00	19 /19¼
Compounded	1.10-1.12	11 /11½
Red Tube	1.15-1.30	11 /11½
Miscellaneous		
Mechanical Blends	1.25-1.50	4½/ 5
White	1.35-1.50	15 /15½

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

PRICES have remained the same as published in our last issue, and owing to a full listing of orders at present, very few new orders are being taken. Consequently prices are more or less nominal. Plants are working to full capacity, and with settlement of recent labor difficulties and all plants now operating, the supply should more nearly approach the demand.

U. S. RUBBER MANUFACTURES EXPORTS were valued at $4,661,333 the first two months of 1937, against $3,735,751 the same period 1936, a 25% increase. This February trade was valued at $2,397,876, against $2,263,457 for January and $1,965,717 for February, 1936.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

EXPORT OPPORTUNITIES

No.	COMMODITY	CITY AND COUNTRY
†2,987	Hard rubber combs, semi-manufactured..	Prague, Czechoslovakia
†2,995	Rubber sole manufacturing machinery	Manila, Philippine Islands
‡3,028	Elastic for girdles and other uses.....	Lima, Peru
*3,029	Crude rubber and chemicals for rubber, textile, and paint industries	Mexico City, Mexico
*3,052	Soles, heels, and rubber in sheets....	Cairo, Egypt
†3,070	Basketballs and volley balls	Montreal, Canada
*3,073	Druggists' sundries..	Alexandria, Egypt
*3,078	Druggists' sundries..	Caracas, Venezuela
‡3,097	Carbon black.....	Grenoble, France
‡3,123	Rubber goods machinery	Brussels, Belgium
‡3,130	Rubberized fabrics..	Port au Prince, Haiti
‡3,160	Rubber bulbs and stoppers	Montreal, Canada
*3,167	Corset elastic fabrics	Istanbul, Turkey
‡3,176	Pharmaceutical rubber specialties	Brussels, Belgium

IMPORT OPPORTUNITIES

¶ 167	Rubber goods	Tokyo, Japan

*Agency. †Purchase. ‡Purchase and agency. ¶Sale.

Summary of Reclaimed Rubber Statistics[1]

United States Consumption—Long Tons[2]

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
January	12,374	20,140	21,068	16,785	11,003	8,440	4,811	7,000	11,261	10,039	13,366
February	14,424	18,670	19,829	14,918	10,800	8,332	4,363	7,646	9,374	7,366	13,485
March	13,528	20,680	20,068	15,616	12,524	7,420	3,454	9,683	10,549	8,767	15,393
April	16,677	19,280	21,574	17,321	11,745	5,561	4,407	9,387	10,466	10,333	....
May	15,754	20,215	23,176	17,473	13,103	6,070	7,770	9,500	9,938	10,398	....
June	15,547	18,140	18,141	14,410	13,045	7,031	9,674	9,459	8,710	11,547	....
July	13,842	19,070	20,236	12,688	11,447	5,131	10,327	8,175	8,396	11,816	....
August	15,836	17,890	18,230	10,999	9,972	4,382	9,446	8,493	8,795	10,993	....
September	14,790	17,795	16,416	10,480	8,932	5,235	7,862	7,024	8,774	11,170	....
October	17,292	18,420	18,024	10,724	8,126	5,494	7,212	8,171	9,662	12,606	....
November	14,876	18,380	14,742	8,816	7,492	5,234	6,335	7,775	9,084	12,029	....
December	13,431	14,320	11,089	8,449	6,812	3,968	5,951	8,284	8,521	12,984	....

United States Stocks—Long Tons[3]

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
January	25,903	21,941	24,394	24,241	20,466	21,084	16,262	24,303	22,291	26,145	31,610
February	27,291	20,848	23,305	24,241	18,878	21,024	16,570	23,356	22,989	28,267	32,817
March	27,124	19,558	22,076	24,415	18,735	22,226	15,496	25,113	20,637	29,161	30,277
April	25,712	19,283	20,680	24,592	18,356	21,525	14,370	22,033	20,521	22,274	....
May	26,419	18,137	19,479	23,356	18,088	18,889	13,734	22,887	18,541	22,852	....
June	25,811	18,709	17,980	24,484	18,505	16,870	13,231	23,664	17,932	22,738	....
July	26,599	17,305	19,679	22,477	17,720	16,333	14,108	24,926	17,810	22,602	....
August	25,157	15,881	22,309	21,636	17,165	14,629	15,037	24,607	18,272	23,750	....
September	23,429	17,991	24,984	20,704	17,226	14,059	15,869	24,540	18,260	24,950	....
October	22,176	17,026	25,474	19,912	17,741	13,911	17,748	24,511	19,640	26,389	....
November	21,728	22,399	26,080	22,000	17,662	14,047	19,170	23,999	21,478	28,135	....
December	24,980	24,785	27,464	22,000	19,257	15,202	20,746	23,079	25,069	30,573	....

Bid Prices of Auto Tire Black Select—Cents per Pound[4]

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
January	10½	8⅜	8	7¾	6	4½	4	5	5¼	5	5¼
February	10½	7½	8½	7¾	6	4¾	4	5	5¼	5	5¼
March	10	8½	8½	7¾	5½	4¼	4	5¼	5¼	5	5¼
April	9½	8¼	8½	7¼	5¼	4	4	5¼	5¼	5	6½
May	9½	8¼	8½	7	5¼	4	4	5¼	5¼	5	...
June	9	8¼	8¼	6½	5¼	4	4	5¼	5¼	5	...
July	9	8¼	8	6½	5¼	4	5¼	5¼	5¼	5	...
August	8¼	8¼	8	6½	5	4	5¼	5¼	5¼	5	...
September	8¼	8	7½	6	5	4	5	5¼	5¼	5	...
October	8¼	8	7½	6	5	4	5	5¼	5¼	5⅜	...
November	8½	8	7¼	6	4¾	4	5	5¼	5¼	5⅜	...
December	8¾	8	7¼	6	4½	4	5	5¼	5	5⅜	...

[1] Consolidation of figures published monthly by INDIA RUBBER WORLD.
[2] Corrected to 100% from estimate of reported coverage.
[3] Stocks on hand the last of each month.
[4] New York Quotations as of 23rd to 28th of each month.

COMPOUNDING INGREDIENTS

IN GENERAL the demand for compounding ingredients has been steady through May, and it is expected that there will be a slight falling off during the summer months with the resumption of a strong market in the fall, although the future is contingent upon a number of conditions which cannot be foretold at this time.

CARBON BLACK. Demand has continued strong, particularly to the tire trade. There is indication of a small increase even over the monthly rate during the first quarter and standard grade blacks are still estimated to be running about 30% ahead of 1936. Production has been increased by many companies, and there appears to be no question but what the demand can be taken care of. Recent indications other than the higher cost of production do not point to higher prices such as earlier in the year were expected around the end of June.

FACTICE. The demand for rubber substitute is good, and prices are firm.

LITHARGE. Demand has been light since the drop in prices on April 7, probably owing to heavy buying during the first quarter. No price change has occurred since April 7.

LITHOPONE. Business during May was quite good, particularly in the East, and is running ahead of April. Indications are that it is considerably ahead of last year. Prices remained at schedule.

RUBBER CHEMICALS. Requirements are holding up to a very satisfactory level, and it is expected that 1937 will be at least equal to 1936.

RUBBER COLORS. The prices of raw materials for toners have been advancing, and if this situation continues, the price of finished goods must increase; but the prices may soon take a downward swing. Demand has been good.

RUBBER SOLVENTS. Demands have increased since the apparent settlement of labor trouble, and shipments into the Akron district have been heavy. Prices for standard and light grades held steady at the levels of 7⅜¢ to 7⅞¢ per gallon that Group 3 refiners have been quoting for some time.

STEARIC ACID. Demand was steady with fair requirements for moderate quantities. Prices remained the same as in April.

TITANIUM PIGMENTS. Compound pigments and titanium dioxide were more active than other opaques. In general the business for May compared favorably with that of April, which was considerably better than in April, 1936, and is expected to establish a new record for monthly consumption. Prices continued steady.

ZINC OXIDE. The purchases by the tire trades were good, and some replacement buying of lead free and low strength leaded oxides has been reported at the higher prices established in March. The price structure remains the same as on April 9, when the higher strength leaded oxides were reduced following the break in lead prices.

New York Quotations

May 27, 1937

Prices Not Reported Will Be Supplied on Application

Abrasive			
Pumicestone, powdered	lb.	$0.03	/$0.03½
Rottenstone, domestic	lb.	.03	/ .03½
Silica, 15	ton	38.00	
Accelerators, Inorganic			
Lime, hydrated	ton	20.00	
Litharge (commercial)	lb.	.08½	
Accelerators, Organic			
A-1	lb.	.26	
A-5-10	lb.	.34	
A-10	lb.	.34	
A-11	lb.	.57	
A-19	lb.	.57	
A-32	lb.	.72	
A-77	lb.	.47	
Accelerator 49	lb.	.42	
808	lb.		
833	lb.		
Acrin	lb.		
Aldehyde ammonia	lb.		
Altax	lb.		
B-J-F	lb.		
Beutene	lb.		
Butyl Zimate	lb.		
C-P-B	lb.		
Captax	lb.		
Crylene	lb.		
Paste	lb.		
D-B-A	lb.		
Di-Esterex	lb.		
Di-Esterex-N	lb.		
DOTG	lb.	.47	
D.O.T.T.U.	lb.		
DPG	lb.	.37	
El-Sixty	lb.	.57	
Ethylideneaniline	lb.		
Formaldehyde P.A.C.	lb.		
Formaldehydeaniline	lb.		
Formaldehyde-para-toluidine	lb.		
Guantal	lb.	.40	/ .50
Hepteen	lb.		
Base	lb.		
Hexamethylenetetramine	lb.		
Lead oleate, No. 999	lb.	.13½	
Witco	lb.	.13	
Methylenedianilide	lb.		
Monex	lb.		
Novex	lb.		
O. N. V.	lb.		
Ovac	lb.		
Pipsolene	lb.	1.75	
R-2	lb.	1.65	
Base	lb.	3.60	
R & H 50-D	lb.		
Safex	lb.		
Super-sulphur No. 1	lb.		
No. 2	lb.		
Tetrone A.	lb.		
Thiocarbanilide	lb.		
Thionex	lb.		
Trimene	lb.		
Base	lb.		
Triphenyl guanidine (TPG)	lb.		
Tuads	lb.		
Ureka	lb.	$0.65	
Blend B	lb.	.65	
C	lb.	.60	
Vulcanex	lb.		
Vulcanol	lb.		
Vulcone	lb.		
Z-B-X	lb.		
Z-88-P	lb.	.51	
Zenite	lb.		
A	lb.		
B	lb.		
Zimate	lb.		
ZML	lb.		
Activator			
Barak	lb.		
Age Resisters			
AgeRite Alba	lb.		
Exel	lb.		
Gel	lb.		
Hipar	lb.		
HP	lb.		
Powder	lb.		
Resin	lb.		
D	lb.		
Syrup	lb.		
White	lb.		
Akroflex C	lb.		
Albasan	lb.		
Antox	lb.		
B-L-E	lb.		
B-X-A	lb.		
Copper Inhibitor X-872	lb.		
Flectol B	lb.	.54	
H	lb.	.54	
White	lb.	1.00	
M-U-F	lb.		
Neozone (standard)	lb.		
A	lb.		
C	lb.		
D	lb.		
E	lb.		
Oxynone	lb.	.68	
Parazone	lb.		
Perflectol	lb.	.67	
Permalux	lb.		
Santoflex A	lb		
Solux	lb.		
Thermoflex	lb.		
A	lb.		
V-G-B	lb.		
Alkalies			
Caustic Soda, flake, columbia (400 lb. drums)	100 lbs	3.00	/$4.00
liquid, 50%	100 lbs.	2.25	
solid (700 lb. drums)	100 lbs.	2.60	/ 3.00
Antiscorch Materials			
A-F-B	lb.		
Antiscorch T	lb.		
Cumar RH	lb.	.09	
Retarder B	lb.		
W	lb.		
T-J-B	lb.		
U.T.B.	lb.		
Antisun Materials			
Heliozone	lb.		
Sunproof	lb.		
Brake Lining Saturant			
B. R. T. No. 3	lb.	.0165/	.0175
Colors			
BLACK			
Lampblack (commercial)	lb.	.15	
BLUE			
Brilliant	lb.		
Prussian	lb.	.37½	
Toners	lb.	.08	/3.50
BROWN			
Mapico	lb.	.13	
GREEN			
Brilliant	lb.		
Chrome, light	lb.		
medium	lb.		
oxide (freight allowed)	lb.	.21	
Dark	lb.		
Guignet's, Easton, Pa., bbls.	lb.	.70	
Light	lb.		
Toners	lb.	.85	/ 3.50
ORANGE			
Lake	lb.		
Toners	lb.	.40	/ 1.60
ORCHID			
Toners	lb.	1.50	/ 2.00
PINK			
Toners	lb.	1.50	/ 4.00

PURPLE

Permanent	lb.	
Toners	lb.	$0.60 /$2.00

RED

Antimony		
Crimson, 15/17%	lb.	.50
R. M. P. No. 3	lb.	.46
Sulphur free	lb.	.48
Golden 15/17%	lb.	.28
7-A	lb.	.35
Z-2	lb.	.22
Aristi	lb.	1.75
Cadmium, light (400 lbs. bbls.)	lb.	.70
Chinese	lb.	
Crimson	lb.	
Mapico	lb.	.09¼
Medium	lb.	
Rub-Er-Red, Easton, Pa., bbls.	lb.	.09¼
Scarlet	lb.	
Toners	lb.	.08 / 2.00

WHITE

Lithopone (bags)	lb.	.04¼/ .04½
Albalith Black Label-11	lb.	.04¼/ .04¾
Astrolith (5-ton lots)	lb.	.04⅛/ .04¼
Azolith	lb.	.04¼/ .04½
Cryptone-19	lb.	.05¾/ .06¼
CB-21	lb.	.05¾/ .06¼
ZS No. 20	lb.	.09 / .09½
No. 86	lb.	.09 / .09½
Sunolith (5-ton lots)	lb.	.04¼
Ray-Bar	lb.	
Ray-Cal	lb.	
Rayox	lb.	
Titanolith (5-ton lots)	lb.	.05¾
Titanox-A (50-lb. bags)	lb.	.16 / .16¾
B (50-lb. bags)	lb.	.05¾/ .06
B-30 (50-lb. bags)	lb.	.05¾/ .06
C (50-lb. bags)	lb.	.05¾/ .06
Ti-Tone	lb.	
Zinc Oxide		
Anaconda, Green Seal		
No. 333	lb.	.07½/ .08
Lead Free No. 352	lb.	.06 / .06½
No. 570	lb.	.06 / .06½
No. 577	lb.	.06 / .06½
Red Seal No. 222	lb.	.07 / .07½
U.S.P. No. 777 (bbls.)	lb	.06 / .06½
White Seal No. 555	lb.	.08 / .08½
Azo ZZZ-11	lb.	.06 / .06¼
44	lb.	.06 / .06¼
55	lb.	.06 / .06¼
66	lb.	.06 / .06¼
French Process, Florence White Seal-7 (bbls.)	lb.	.08 / .08½
Green Seal-8	lb.	.07½/ .08
Red Seal-9	lb.	.07 / .07½
Kadox, Black Label-15	lb.	.06¼/ .06¾
Blue Label-16	lb.	.06¼/ .06¾
Red Label-17	lb.	.06¼/ .06¾
No. 25	lb.	.06¼/ .06¾
Horse Head Special 3	lb.	.06 / .06½
XX Red-4	lb.	.06 / .06½
23	lb.	.06 / .06½
72	lb.	.06 / .06½
78	lb.	.06 / .06½
80	lb.	.06 / .06½
103	lb.	.06 / .06½
110	lb.	.06 / .06½
St. Joe (lead free)		
Black Label	lb.	.06 / .06¼
Green Label	lb.	.06 / .06¼
Red Label	lb.	.06 / .06¼
U.S.P. X	lb.	.09 / .09¼
White Jack	lb.	.09 / .09¼

YELLOW

Cadmolith (cadmium yellow), 400 lb. bbls.	lb.	.45
Lemon	lb.	
Mapico	lb.	.09½
Toners	lb.	2.50

Dispersing Agents

Bardol	lb.	.0215/ .024
Darvan	lb.	

Factice

Amberex	lb.	.23
Brown	lb.	.09 / .15
Neophax A	lb.	.14
B	lb.	.13¾
Fac-Cel B	lb	.17
C	lb	.17
White	lb	.10 / .16½

Fillers, Inert

Asbestine, c.l., f.o.b. mills	ton	15.00
Barytes	ton	30.00
f.o.b. St. Louis (50 lb. paper bags)	ton	22.85
off color, domestic	ton	20.00 /25.00
white, imported	ton	29.00 /32.00
Blanc fixe, dry, precip.	lb.	.03½ .05
Calcene	ton	37.50 /45.00
Infusorial earth	lb.	.02 / .03
Kalite No. 1	ton	
No. 3	ton	
Magnesia, calcined, heavy	lb.	.04
Carbonate L.C.L.	lb.	.07 / .09
Pyrax	ton	
Whiting		
Columbia Filler	ton	$9.00 /$14.00
Domestic	100 lbs.	
Guilders	100 lbs.	
Hakuenka	lb.	
Paris white, English cliff-stone	100 lbs.	
Southwark Brand, Commercial	100 lbs.	
All other grades	100 lbs.	
Suprex, white extra light	ton	45.40 /60.00
heavy	ton	45.40 /60.00
Witco, c.l.	ton	7.00

Fillers for Pliability

P-33	lb.	
Thermax	lb.	
Velvetex	lb.	.03 / .04½

Finishes

IVCO lacquer, clear	gal.	1.00 / 2.25
colors	gal.	2.85 / 3.25
Rubber lacquer, clear	gal.	
colored	gal.	
Starch, corn, pwd.	100 lbs.	
potato	lb.	
Talc	ton	25.00 /45.00

Flock

Cotton flock, dark	lb.	.12½/ .14
dyed	lb.	.50
white	lb.	.14½/ .20
Rayon flock, colored	lb.	1.25 / 1.60
white	lb.	1.10

Latex Compounding Ingredients

Accelerator 85	lb.	
89	lb.	
122	lb.	
552	lb.	
Alphasol-OS	lb.	.60
Antox, Dispersed	lb.	
Aquarex A	lb.	
D	lb.	
F	lb.	
Areskap No. 50	lb.	.20
No. 100, dry	lb.	.43
Aresket No. 240	lb.	.18
No. 250, alcoholic	lb.	.22
No. 300, dry	lb.	.46
Aresklene No. 375	lb.	.40
No. 400, dry	lb.	.56
Black No. 25, Dispersed	lb.	.22 / .40
Catalpo	ton	
Color Pastes, Dispersed	lb.	
Dispersex No. 15	lb.	.80 / .95
No. 20	lb.	.60 / .75
Emo, brown	lb.	.15
white	lb.	.15
Factice Compound, Dispersed	lb.	.40
Heliozone, Dispersed	lb.	
Igepon A	lb.	
MICRONEX, Colloidal	lb.	.06 / .07
Nekal BX (dry)	lb.	
Palmol	lb.	.10
Paradors	lb.	
S.1. (50-55 gallon drums)	lb.	.65
Stablex A	lb.	.80 / 1.10
B	lb.	.40 / .90
C	lb.	.30 / .50
Sulphur, Dispersed	lb.	.10 / .15
No. 2	lb.	
T.1. (400 lb. drums)	lb.	.40
Tepidone	lb.	
Vulcan Colors	lb.	
Zinc oxide, Colloidal	lb.	
Dispersed	lb.	.09 / .15

Mineral Rubber

B. R. C. No. 20	lb.	.009 / .01
Black Diamond	ton	25.00
Genasco Hydrocarbon, granulated, (fact'y)	ton	
solid	ton	
Gilsonite Hydrocarbon (factory)	ton	
Hydrocarbon, hard	ton	
soft	ton	
Parmr Grade 1	ton	25.00
Grade 2	ton	25.00
Pioneer	ton	
265°	ton	

Mold Lubricants

Lubrex	lb.	
Mold Paste	lb.	.18
Sericite	ton	65.00 /75.00
Soapbark	lb.	
Soapstone	ton	25.00 /35.00

Oil Resistant

AXF	lb.	

Reclaiming Oils

B. R. V.	lb.	.03 / .0325
S. R. O.	lb.	.0175/ .0185

Reenforcers

Carbon Black		
Aerfloted Arrow Specification Black	lb.	.0535/ .0825
Arrow Compact Granulized Carbon Black	lb.	
"Certified" Heavy Compressed, Cabot	lb.	
Spheron	lb.	
Disperso, c.l.	lb.	$0.0445/$0.0535
Dixie, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Dixiedensed, c.l., f.o.b., New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Dixiedensed 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Excello, c.l., f.o.b. Gulf ports	lb.	.0445/ .0645
delivered New York	lb.	.0535/ .0735
l.c.l., delivered New York	lb.	.07 / .08¼
Fumonex, c.l., f.o.b. works	lb.	.03
ex-warehouse	lb.	.04½
Gastex	lb.	.03 / .07
Kosmobile, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Kosmobile 66, c.l., f.o.b New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Kosmos, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
MICRONEX Beads, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
Mark II, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
Standard, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
W-5, c.l., f.o.b., Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
W-6, c.l., f.o.b., Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
Pelletex	lb.	.03 / .07
Supreme, c.l., f.o.b. Gulf ports	lb.	.0445/ .0645
delivered New York	lb	.0535/ .0735
l.c.l., delivered New York	lb.	.07 / .08¼
"WYEX BLACK"	lb.	
Carbonex	lb.	.029 / .0315
Carbonex "S"	lb.	.0315/ .034
Clays		
Aerfloted Paragon (bulk)	ton	6.50
Suprex No. 1 Selected	ton	10.00
No. 2 Standard	ton	9.00
China	ton	17.50 /20.00
Dixie	ton	
Junior	ton	
McNamee	ton	
Par	ton	
Witco	ton	9.00
Cumar EX	lb.	.035

Reodorants

Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Paradors	lb.	
Rodo No. 6	lb.	
No. 10	lb.	

Rubber Substitutes

Black	lb.	.07¾/ .13½
Brown	lb.	.08½/ .14
White	lb.	.09⅜/ .15¼

(Continued on page 94)

ADVERTISING PAGES REMOVED

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)

Allow nine words for keyed address. *Replies forwarded without charge.*

SITUATIONS WANTED

WITH 20 YEARS' EXPERIENCE IN CALENDER ROOM AND mills, also compounding. Capable of taking charge of calender room and mills. Can give excellent reference. Address Box No. 819, care of INDIA RUBBER WORLD.

WORKS ENGINEER, FIFTEEN YEARS' EXPERIENCE. The best equipped, most experienced engineer in the world on plant layout for unit vulcanizers and the last-minute methods for tire building, with new ideas and looking ahead. Address Box No. 822, care of INDIA RUBBER WORLD.

LATEX AND INORGANIC ANALYST: B.S. 1928, EIGHT YEARS' experience analyzing latex, latex compounds, rubber dispersions, accelerators, antioxidants, and acids. Desire immediate position with concern using latex or making inorganic chemicals. Address Box No. 825, care of INDIA RUBBER WORLD.

SUPERINTENDENT OR MANAGER OF SMALL PLANT. TEN years' experience with mechanicals, hard rubber, and dipped goods. Thorough knowledge compounding, costs, and production methods. Employed, but desire to make change. Address Box No. 826, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

WANTED: A MAN OF ABILITY AS A SALES REPRESENTATIVE for a rubber company well known in the field of rubber and plastics. Working knowledge of rubber desirable, knowledge of plastics essential. Age not over 45. Address Box No. 820, care of INDIA RUBBER WORLD.

SITUATIONS OPEN—Continued

WANTED: EXPERIENCED SALESMAN HAVING COMPLETE technical knowledge and experience in application of inerts, such as clays, whiting, mica, earth colors, etc., in paint, rubber, and allied industries. State fully experience and qualifications. Address Box No. 824, care of INDIA RUBBER WORLD.

RUBBER CHEMICAL SUPPLY COMPANY DESIRES to engage for sales work in the Chicago territory a man with technical training and experience in the rubber industry. Address Box No. 828, care of INDIA RUBBER WORLD.

WAREHOUSE MANAGER. MUST BE EXPERIENCED IN SHIPping, receiving, and handling labor. One located East preferred. State fully age and experience. Applications treated strictly confidentially. Address Box No. 829, care of INDIA RUBBER WORLD.

SALESMEN WANTED: A MODERNLY EQUIPPED RUBBER plant near New York City, manufacturing molded rubber goods, sponge rubber products, etc., at competitive prices, has openings for several good salesmen who have a following. Commission basis. Advise in complete detail. Address Box No. 831, care of INDIA RUBBER WORLD.

CORONA GOLF BALL WINDING MACHINES

Used everywhere by manufacturers. Rented on a monthly basis in U. S. Sold outright in foreign countries.

Illustrated circular on request.

Corona Manufacturing Company

Mount Airy, Philadelphia, Pa., U. S. A.

BARBER *Genasco* (M.R.) Hydrocarbon

(SOLID OR GRANULATED)

A hard, stable compound—produced under the exacting supervision of an experienced and up-to-date laboratory. Aging tests have proved Genasco to be *always* of uniform quality. Shipped to all parts of the world in metal drums. Stocks carried at Maurer, N. J. and Madison, Ill.

THE BARBER COMPANY, INC.

New York Philadelphia Madison, Ill. Chicago

SUMMIT

AIR OPERATED PRESSURE CONTROLLER

Will maintain constant pressure, being sensitive to less than ¼ lb. Rugged and easily adjusted with independent knurled knob. Comes complete with 3 gauges. May be changed quickly from direct to reverse action. Eight models ranging from 1 to 500 lbs. for vulcanizers, platen presses.

Write for descriptive matter and prices.

INDUSTRIAL INSTRUMENT CO., 96 E. Miller Ave., AKRON, O.

Having our own machine shops we are fully prepared to offer thoroughly rebuilt and guaranteed:—

ACCUMULATORS	**MIXERS**	**PUMPS**
CALENDERS	**CHURNS**	**SPREADERS**
CUTTING MACHINES	**MOTORS**	**TUBERS**
MILLS	**PRESSES**	**VULCANIZERS**

L. ALBERT & SON

Offices and Warehouses

336 Whitehead Road, TRENTON, N. J. Adams, Arch and Union Streets, AKRON, O.

European Office and Representative—Mr. Andre Berjonneau, #33 Blvd. des Batignolles, 33, Paris (VIII) France

(*Advertisements continued on page 95*)

Important American Export Products Upon Which Duty Reductions or Other

Rubber

(Countries listed in order of effective dates of agreements, as indicated percentages of former duties; quota increases are stated in fractions

Classes of Products Involved: (Not necessarily including all products in every class)	Total Value of Average Annual U.S. Exports 1926-1930 (Thousands)	Cuba Sept. 3, 1934	Belgium May 1, 1935	Haiti June 3, 1935	Sweden Aug. 5, 1935	Brazil Jan. 1, 1936	Canada Jan. 1, 1936
Rubber tires	30,092	Pneumatic—Cut 25% Pref. incr. 20%** Solid—Duty bound	....	Duty cut 40% (conditionally)†	Duty cut 17%	Duty cut 25%	Duty cut 14%
Inner tubes for tires	3,232	Duty cut 12% Pref. incr. 10%	....	Cut 45% (conditionally)†	....	Duty cut 25%	Duty cut 14%
Rubberized piece goods	1,606	Cotton—Cut 14-61% Pref. incr. 10%; Silk or wool—Bound	....	....	....	....	Duty cut 14%
Rubber boots and shoes, and canvass rubber-soled shoes	8,629	Duty cut 26-37% Pref. incr. 20%	....	....	....	....	Duty cut 10-12%
Rubber heels and soles	1,496	Duty cut 19% Pref. incr. 15%	....	....	Duty bound	....	Duty cut 18%
Rubber belting and belts	2,675	Duty bound	Duty cut 13% (belting)	....	Duty bound (transmission and conveyer belts)	Duty cut 10%	Duty cut 9%
Rubber hose and tubing	2,678	Duty bound	Duty cut 28%	....	....	Duty cut 25% (weighing 250 grams per lineal meter and up)	Duty cut 14%
Other rubber manufactures	....	Packing—Duty bound; Other—Duty cut 19% Pref. incr. 15%	....	....	....	....	Duty cut 14-18% (all)

*Issued by Department of Commerce, Bureau of Foreign and Domestic Commerce, Leather and Rubber Division, Washington, D. C.
**"Pref. incr." (preferential increase) means that the difference between duty on American products and foreign products has been widened.
†One of the three products on which reduction does not become effective until Haitian budget for a given fiscal year is promulgated at 40,000,000 gourdes or more.

GERMANY

(*Continued from page 74*)

Before the innermost cover is applied next to the iron core, the latter is coated with an alcoholic solution of chloride of copper. This innermost cover is made of:

	Kilos
Rubber	15.230
Reogen (after D.R.P. 616,147)	0.076
Colophony	0.076
Litharge	0.690
Iron cinnabar	3.024
Chalk	11.942
Velvet sulphur	6.092

German rubber-covered printing rolls appear to have been found very satisfactory in foreign countries, for considerable quantities are exported annually.

Chemical Exhibition

The Achema VIII Chemical Engineering Exhibition will be held July 2 to 11 at Frankfurt a.M. on the occasion of the National Convention of German Chemists. "The Achema Annual 1937," ready for distribution in May, which has 388 pages, will review with practically no omission the many products for scientific and industrial purposes of the German Chemical Apparatus and Plant Building Industry as these products will be shown. This annual prepares the visitor for what he will see at this great exhibition. "The Achema Annual 1937" is supplied free of charge to those who have registered their visit to the Achema VIII in advance. Only three international reply coupons need be sent to cover postage. Prospective visitors to the Achema VIII may now register in advance at the Dechema German Society for Chemical Engineering, 103a Potsdamerstrasse, Berlin W.35.

Notes

It is interesting to note that despite the various restrictions in the use of raw rubber in the manufacture of rubber goods for some consumption, imports of natural rubber have been mounting steadily under the present regime. During the first quarter of 1937 net imports were 229,832 quintals against 156,177 in the corresponding period of 1936. In addition the imports of manufactured goods include a growing amount of old tires, which, as they are used for reclaiming purposes, must be included with raw rubber. In the first quarter of 1937 imports of manufactured rubber goods rose to 25,047 quintals, value 1,603,000 marks, against 4,091 quintals, value 748,000 marks. Incidentally, the large increase in entries of old tires explains why the 600% increase in quantity is accompanied by an increase in value of only about 200%.

German exports of rubber goods rose from 37,140 quintals, value 9,582,000 marks, in the first quarter of 1936 to 44,885 quintals, value 10,597,000 marks in the 1937 period.

Dr. Cassirer & Co., A.G., Berlin, closed a satisfactory year with net profits of 536,541 marks, against 367,455 marks, and distributed a dividend of 10%.

After an interval of six years without dividends, Veritas Gummiwerke, Berlin, resumed the payment of a dividend, turning out 6% on a capital of 792,000 marks. Profits were 57,668 marks against 78,233 marks for the preceding business year, but practically all of the latter amount had to be used to wipe out earlier losses.

Veith Werke A.G., Sandbach, was able to improve both its home and foreign business in 1936, but net profits were somewhat lower, 138,602 against 144,366 marks. A dividend of 7% was paid.

Vereinigte Gothania A.G., Gotha, reports increased business in the domestic market, but greatly reduced foreign business during the latter half of 1936. This company also declared a 7% dividend.

POLAND

Poland's imports of both crude and manufactured rubber increased during 1936 as compared with 1935, the former from 4,367 to 4,871 tons, and the latter from 902 tons, value 4,064,000 zloty, to 972 tons, value 4,362,000 zloty. The Polish output of rubber shoes fell from 3,864,000 pairs, value 7,382,000 zloty, to 3,600,000 pairs, value 6,831,000 zloty; galoshes rose from 1,699,000 pairs, value 4,892,000 zloty, to 3,864,000 pairs, value 7,382,000 zloty; snowshoes rose in quantity from 1,613,000 to 1,621,000

Concessions Have Been Obtained in the 16 Trade Agreements Thus Far Concluded*

Products

under name. Reductions in duties or other import charges stated in of former quotas. In some cases estimates were necessary.)

Netherlands (A) and Indies (B) Feb. 1, 1936	Switzerland Feb. 15, 1936	Honduras Mar. 2, 1936	Colombia May 20, 1936	Guatemala June 15, 1936	France June 15, 1936	Nicaragua Oct. 1, 1936	Finland Nov. 2, 1936	El Salvador Not Yet Effective
{ A: Duty bound { B: Duty bound‡	{ Duty bound { Quota incr. 1/7	Bound free	Duty bound	Duty cut 33%	Duty cut 33%	Duty bound (except solid)	Duty cut 10%	Duty cut 65%
{ A: Duty bound { B: Duty bound‡	{ Duty bound { Quota incr. 1/7	....	Duty bound	Duty cut 33%	Duty cut 33%	Duty bound	Duty cut 10%	Duty cut 65%
....	....	....	....	....	Duty cut 33%	....	....	....
A: Quota assured	....	....	Cut 37-50%§	....	.....	....	....	....
....	....	....	Duty bound	....	{ Duty cut 22%, Quota incr. 2/9 (restriction removed later)	Duty cut 40% (heels)	....	....
....	....	....	Duty bound	....	{ Duty cut 22%, Quota incr. 2/9 (restriction removed later)	....	Duty bound	....
....	....	....	Duty bound	....	{ Duty cut 22%, Quota incr. 2/9 (restriction removed later)	....	....	Duty cut 65%
....	....	....	Duty bound (packing, rings, etc).	....	{ On various mfgs.—cut 22%; Quota incr. 2/9 (restriction later removed); Duty cut 13-75%¶	....	....	....

‡Reservation has been made concerning imposition of quotas on this product in Netherland India.
§Fabric footwear (except silk or artincial silk, plush, etc.) with soles of leather, rubber, etc.
¶Clothing—duty cut 75%; packing and hard rubber products—13 to 55%; selected sundries—13%.

pairs, but the value declined from 7,834,000 to 6,911,000 zloty. Poland's exports of rubber shoes has been dwindling for years, and in 1936 were only 92 tons, value 333,000 zloty, against 169 tons, value 713,000 zloty, in 1935.

ITALY

Italy, like Germany and Russia, has for some time been striving to attain economic self-sufficiency, and in a recent speech Premier Mussolini is reported to have stated that this course would be continued with unabated vigor. Reviewing Italy's situation with regard to the supply of the most important raw materials, he touched on rubber and is quoted as saying that experiments in synthetic rubber had progressed to the stage where it could be made on a commercial scale and that a company, financed partly by the government and partly by private interests, was shortly to be established, thereby permitting Italy to become completely self-sufficient as far as rubber was concerned. Also, various Italian textile fibers put on the market have proved so satisfactory that here too complete independence from foreign sources is looked for.

NEW MACHINES

(*Continued from page 62*)

Being equipped with a stop motion, the machine automatically stops in case the yarn gets snarled or a cone becomes empty. By the aid of standard attachments this machine will take a range of sizes from the smallest pump tubing to hose 1¼ inches in diameter. By changing gears the mesh can be varied from very fine stitches to a coarse open weave. The output depends upon the material produced, and for ⅝-inch garden hose, the production would be about 8 feet per minute. The outstanding features of this machine are the low power requirements and low labor and maintenance costs. Fidelity Machine Co.

BOOK REVIEWS

(*Continued from page 80*)

been inserted after each paragraph affected; also the changes in rates of duty covered by the President's proclamation and by acts of Congress. In the trade agreements section are included Schedules I (export) and Schedules II (import) of each of the trade agreements. The Customs regulations appear completely revised to date and include all Treasury Decisions and other changes enacted since these regulations were originally issued.

Other information includes port sections which completely cover the activities and facilities of all principal ports; and a section of general information, including Federal Alcohol Administration, Department of Agriculture, Department of Commerce, Bureau of Foreign and Domestic Commerce, and much other additional information.

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GLUE IN RUBBER

(*Continued from page 82*)

Societe Franco-Belge du Caoutchouc-Mousse, at Aurec-sur-Loire.

A note appended to the above item states that the Societe Epidos has been using an identical process for producing rubber-glue compounds. Its process, for which patent has been applied,[2] has been made use of in collaboration with one of the largest French rubber manufacturers.

[2] French patent No. 800,317, Apr. 10, 1935.

New York Quotations

(Continued from page 88)

Softeners

Burgundy pitch	lb.	$0.06
Cycline oil	gal.	.20
Palm oil (Witco)	lb.	.07
Pine tar	gal.	
Plastogen	lb.	
Reogen	lb.	
Rosin oil, compounded	gal.	.40
RPA No. 1	lb.	
No. 2	lb.	
Rubtack	lb.	.10
Tackol	lb.	.115
Powder	lb.	
Tonox	lb.	.16
Witco No. 20	gal.	.18

Softeners for Hard Rubber Compounding

Resin C Pitch 55° C. M.P.	lb.	.0125/$0.0135
Resin C Pitch 70° C. M.P.	lb.	.0125/ .0135
Resin C Pitch 85° C. M.P.	lb.	.0125/ .0135

Solvents

Beta-Trichlorethane	gal.	
Bondogen	lb.	
Carbon bisulphide	lb.	
tetrachloride	lb.	

Stabilizers for Cure

Laurex, ton lots	lb.	
Stearic B	lb.	$0.108 /$0.118
Beads	lb.	.108 / .118
Stearic acid, single pressed	lb.	.11½
Stearite	100 lbs.	10.50 /11.80
Zinc stearate	lb.	.23

Synthetic Rubber

Neoprene Latex Type 50	lb.	
53	lb.	
54	lb.	
Type E	lb.	
"Thiokol" A (f.o.b. Yardville)	lb.	.35
Coating Materials	gal.	2.50 / 5.00
DX	lb.	$0.55
Molding Powder	lb.	.50 /$0.75

Tackifier

B. R. H. No. 2	lb.	.015 / .016

Varnish

Shoe	gal.	1.45

Vulcanizing Ingredients

Sulphur		
Chloride, drums	lb.	.03½/ .04
Rubber 100	lb.	2.00
Telloy	lb.	
Vandex	lb.	

(See also Colors—Antimony)

Waxes

Carnauba, No. 3 chalky	lb.	.36 / .36½
2 N.C.	lb.	.40 / .41
3 N.C.	lb.	.37½/ .38
1 Yellow	lb.	.46½/ .47
2	lb.	.45½/ .46
Montan, crude	lb.	.11 / .11½

U. S. Crude and Waste Rubber Imports for 1937

	Plantations	Latex	Paras	Africans	Centrals	Manicoba and Guayule	Matto Grosso	Totals 1937	Totals 1936	Balata	Miscellaneous	Waste
Jan. ..... tons	30,674	1.171	625	167	23	160	..	32,820	31,292	13	383	201
Feb.	40,326	2,100	717	15	2	129	..	43,289	35,219	37	1,300	217
Mar.	48,367	2,117	1,285	47	11	212	..	52,039	37,451	21	894	572
April	33,147	1,683	734	79	17	190	..	35,850	40,365	6	283	99
Total, 4 mos., 1937 ..... tons	152,514	7,071	3,361	308	53	691	..	163,998	.....	77	2,860	1,089
Total, 4 mos., 1936 ..... tons	136,294	5,029	3,096	494	129	285	..	.....	144,327	342	3,168	904

Compiled from The Rubber Manufacturers Association, Inc., statistics.

United States Latex Imports

Year	Pounds	Value
1934	29,276,134	$3,633,253
1935	30,358,748	3,782,222
1936	44,469,504	6,659,899
1937		
Jan.	2,995,027	535,546
Feb.	4,418,474	775,202
Mar.	4,962,915	968,053

Data from Leather and Rubber Division, United States Department of Commerce, Washington, D. C.

World Net Imports of Crude Rubber

Year	U.S.A.	U.K.	Australia	Belgium	Canada	Czechoslovakia	France	Germany	Italy	Japan	Russia	Rest of the World	Total
1934	439,100	158,500	9,600	9,100	28,400	11,000	50,400	59,300	21,400	69,900	47,300	60,500	964,500
1935	455,800	128,800	10,000	7,600	26,900	11,200	52,300	62,900	26,100	57,600	37,600	57,100	933,900
1936	475,361	6,785	14,423	9,627	27,867	8,772	56,777	71,793	17,000	61,701	30,967	59,847	827,350
1936													
Jan.	33,260	4,573	1,260	760	1,758	767	6,770	5,545	1,500*	4,357	467	5,121	66,138
Feb.	33,789	1,271	735	779	1,900	344	6,288	5,257	1,000*	3,305	94	5,268	60,030
Mar.	33,743	1,227	819	1,033	1,809	410	4,342	4,568	1,000*	5,172	4,376	5,433	61,475
Apr.	44,949	2,097	969	1,097	1,079	603	4,261	5,497	1,500*	4,931	3,251	4,723	70,763
May	35,549	302	1,053	698	2,221	667	4,342	4,639	1,000*	5,531	4,220	4,380	64,602
June	35,901	1,493	1,693	579	2,042	323	4,860	5,698	1,500*	4,567	2,427	4,176	62,273
July	38,556	766	1,455	713	2,274	495	4,631	6,837	2,000*	5,126	1,733	4,532	67,586
Aug.	41,094	1,581	762	789	3,780	989	4,522	6,556	1,500*	4,305	3,128	4,259	70,103
Sept.	49,483	12	2,336	513	2,393	624	4,402	6,006	1,500*	5,197	2,922	5,159	80,523
Oct.	40,301	87	1,124	817	3,110	1,026	4,423	7,232	1,500*	6,602	2,761	5,509	74,318
Nov	37,898	742	997	1,090	4,308	823	3,289	6,500	1,500*	3,934	2,162	5,681	67,440
Dec.	50,838	4,926	1,220	759	1,193	1,701	4,647	7,458	1,500*	8,674	3,426	5,606	82,096
1937													
Jan.	42,655	242	590	854	1,632	567	4,440	7,041	2,000*	8,298	2,633	5,508	75,976
Feb.	44,398	222	331	1,363	1,271	837	5,537	7,911	2,000*	6,605	3,048	4,507	77,586

* Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Shipments of Crude Rubber from Producing Countries

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Siam	French Indo-China	Philippines and Oceania Total	Philippines and Oceania	Africa	South America	Mexican Guayule	Grand Total
1934	467,400	379,400	79,100	6,500	6,300	11,100	17,700	17,700	19,600	1,004,800	1,400	3,500	9,100	400	1,019,200
1935	417,000	282,900	54,300	9,100	4,900	8,900	19,500	28,300	28,700	853,600	1,500	5,000	12,200	500	872,800
1936	353,667	309,641	49,685	8,648	5,859	8,177	21,237	34,578	40,830	832,322	1,619*	6,122	14,632	1,228	855,923
1936															
Jan.	26,637	20,778	4,178	419	880	938	2,317	1,665	2,449	60,261	105	494	1,796	70	62,726
Feb.	19,692	27,991	3,664	871	511	529	2,107	3,663	2,894	61,922	225	620	1,177	75	64,019
Mar.	34,597	19,403	4,336	750	574	342	1,848	2,966	2,553	67,369	133	535	1,175	40	69,252
Apr.	21,667	25,255	3,172	413	817	869	2,053	1,596	2,416	58,258	92	533	1,044	103	60,030
May	34,108	22,121	2,560	632	485	517	2,354	2,077	2,282	67,136	103	493	1,018	88	68,838
June	25,115	26,401	3,766	673	553	461	1,386	3,737	2,733	64,825	153	456	947	97	66,478
July	34,214	33,911	3,773	1,048	311	1,035	1,399	3,734	2,738	82,163	155	423	1,013	96	83,850
Aug.	30,253	25,313	3,940	655	121	656	2,541	3,284	3,017	69,780	162	444	681	146	71,213
Sept	34,160	21,835	5,367	588	76	537	1,139	3,259	3,505	70,466	164	508	1,070	106	72,314
Oct.	33,591	28,777	5,599	809	372	1,086	2,143	3,349	3,874	79,600	162	593	1,287	114	81,756
Nov.	30,549	30,476	4,960	607	698	701	1,950	2,260	3,872	76,073	64	396	1,663	159	78,355
Dec.	29,084	27,380	4,370	1,183	461	506	....	2,988	8,497	74,469	101	627	1,761	134	77,092
1937															
Jan.	24,746	27,122	4,514	487	579	1,234	4,063	3,849	2,828	69,422	80	600*	1,286	160	71,548
Feb.	24,138	26,770	5,603	1,033	843	790	2,043	3,554	3,089	67,863	180	500*	1,789	206	70,538
Mar.	40,138	40,490	7,066	891	1,149	1,239	1,425	3,873	3,174	99,445	150*	500*	1,792	200*	102,087

*Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Classified Advertisements

Continued

BUSINESS OPPORTUNITIES

DESIRE TO REPRESENT, IN CHICAGO AREA, specialty rubber manufacturer making molded goods, tubing, and other extruded items. Commission only. Address Box No. 823, care of INDIA RUBBER WORLD.

MACHINERY AND SUPPLIES FOR SALE

FOR SALE: EQUIPMENT STILL SET UP IN PLANT AS WHEN last used. Attractively priced! East Liverpool, Ohio. 2 Watson-Stillman 3,000 lb. steam driven hydraulic pumps; Watson-Stillman air accumulator; Watson-Stillman 12-inch hydraulic press; 2 Devine No. 11 vacuum shelf driers. Send for complete list. STEIN-BRILL CORPORATION, 183 Varick St., New York, N. Y.

MACHINERY AND SUPPLIES WANTED

WANTED: A 60-INCH MILL OR LARGER IN EXCELLENT CONdition. Could use also herringbone reduction drive, safety brake and motor to go along with mill. Please give full particulars as well as prices. Martin Rubber Co., Long Branch, N. J.

WANTED: No. 9 BANBURY MIXER WITH DRIVE, ALSO 60-inch rubber mill. Give age and full particulars. Address Box No. 821, care of INDIA RUBBER WORLD.

WANTED: WE CAN USE AN 84-INCH MILL COMPLETE WITH all fittings. Must be in good condition. Address, giving details as to price and location, Box No. 827, care of INDIA RUBBER WORLD.

WANTED: FOR OUR EXPANSION PROGRAM, GOOD USED equipment including Experimental Machines, Large Size Mills and Calenders, Tubers, Hydraulic Presses and a Banbury Mixer, etc. Advise us of your offerings. Address Box No. 830, care of INDIA RUBBER WORLD.

FOSTER D. SNELL, INC.
Chemists—Engineers
Every form of Chemical Service
295 Washington Street **Brooklyn, N. Y.**
215 N. Calvert Street, Baltimore, Maryland

New and Used
RUBBER MACHINERY
M. NORTON & COMPANY
MEDFORD **MASS.**

We Buy and Sell
USED
SPEED REDUCERS
All Makes, Types, Sizes and Ratios
REEVES DRIVES
In Stock—No. 000 to No. 7
Save 60% of New Costs
All used material overhauled and guaranteed.
We Buy Your Surplus Transmissions.
Patron Millwright & Transmission Co.
156 Grand St. New York, N. Y.

We Have a Completely Equipped Plant for Manufacturing
RUBBER SPECIALTIES
Backed by years of experience.
Let us quote on your requirements without obligation, of course.
ADMIAR RUBBER CO.
273 Van Sindren Ave., **Brooklyn, N. Y.**
Division of Ideal Novelty & Toy Co., Inc.
Long Island City, New York

MECHANICAL
MOLDED RUBBER GOODS
We Solicit Your Inquiries
THE BARR RUBBER PRODUCTS COMPANY
SANDUSKY, OHIO

Precipitated Surinam Balata
For golf ball manufacturers. Approximately 99% deresinated. Dependable deliveries. You also avoid fire or explosion hazard. Purer and cheaper than you can make it. Sample and price on request.
HUNTINGDON MANUFACTURING CO.
MEADOWBROOK, PA.

HYDRAULIC VALVES

Operating, Globe, Angle, or Check Valves—Hydraulic Presses, Accumulators, Pumps, etc.—For almost any size or pressure.
Dunning & Boschert Press Co., Inc.
336 W. WATER ST. **SYRACUSE, N. Y.**

GUARANTEED REBUILT MACHINERY
IMMEDIATE DELIVERIES FROM STOCK
MILLS, CALENDERS, TUBERS, HYDRAULIC PRESSES, PUMPS, VULCANIZERS, TIRE MAKING EQUIPMENT, MOULDS, ETC.
UNITED RUBBER MACHINERY EXCHANGE
319-323 FRELINGHUYSEN AVE., Cable Address "Urmo" NEWARK, N. J.

GUAYULE RUBBER
Washed and Dry, Ready for Compounding
PLANTATION RUBBER
From Our Own Estates in Sumatra
CONTINENTAL RUBBER COMPANY OF NEW YORK
745 Fifth Avenue New York

United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	February, 1937		Two Months Ended February, 1937	
UNMANUFACTURED—*Free*	Pounds	Value	Pounds	Value
Crude rubber	95,743,314	$16,470,867	189,827,236	$31,879,109
Liquid latex	4,418,474	775,202	7,413,501	1,310,748
Jelutong or pontianak	542,999	61,741	1,095,566	117,797
Balata	31,676	5,838	54,292	10,186
Gutta percha	12,945	5,665	296,085	57,682
Guayule	461,100	56,807	819,600	100,973
Siak	22,400	1,900	22,400	1,900
Scrap and reclaimed	847,184	23,737	2,721,571	44,017
Totals	102,080,092	$17,401,757	202,250,251	$33,522,412
Chicle, crude—*Free*	857,017	$275,861	2,317,427	$698,346
MANUFACTURED—*Dutiable*				
Rubber tires—*number*	2,674	$7,067	8,025	$21,050
Rubber boots, shoes, and overshoes—*pairs*	7,768	3,928	11,600	6,149
Rubber soled footwear with fabric uppers—*pairs*	88,689	16,885	163,536	31,009
Golf balls—*number*	1,452	380	6,012	1,530
Lawn tennis balls—*number*	11,886	1,011	73,280	5,822
Other rubber balls—*number*	671,642	26,157	1,353,110	50,615
Other rubber toys, except balls	129,905	20,131	176,580	26,846
Hard rubber combs—*number*	64,656	3,919	140,256	8,356
Other manufactures of hard rubber	.....	2,876	.....	7,917
Friction or insulating tape	.....	.....	9,300	545
Belts, hose, packing, and insulating material	.....	22,402	.....	26,820
Druggists' sundries of soft rubber	.....	5,456	.....	10,815
Inflatable swimming belts, floats, etc.—*number*	173,890	9,366	321,641	18,541
Other rubber and gutta percha manufactures—*lb.*	159,500	33,199	271,265	54,489
Totals	.....	$152,777	.....	$270,504

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber	1,172,084	$236,853	3,062,092	$608,906
Balata	101,052	29,257	158,211	44,631
Gutta percha, rubber substitutes, and scrap	74,487	17,043	78,697	18,325
Rubber manufactures	.....	555	.....	2,790
Totals	.....	$283,708	.....	$674,652

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed	2,118,300	$90,579	4,036,892	$178,329
Scrap	4,578,944	81,294	6,133,745	129,640
Cements—*gal.*	21,974	19,526	43,309	37,610
Rubberized automobile cloth, *sq. yd.*	38,702	16,685	86,968	38,617
Other rubberized piece goods and hospital sheeting—*sq. yd.*	135,749	54,603	262,155	105,460
Footwear				
Boots—*pairs*	8,651	18,644	20,680	45,754
Shoes—*pairs*	37,985	17,231	51,310	25,847
Canvas shoes with rubber soles—*pairs*	33,797	16,165	49,331	25,434
Soles—*doz. prs.*	1,912	3,918	6,401	11,640
Heels—*doz. prs.*	41,180	19,542	104,238	54,732
Soling and top lift sheets	62,211	9,184	96,573	15,020
Gloves and mittens—*doz. prs.*	6,763	13,648	13,116	26,470
Water bottles and fountain syringes—*number*	17,767	6,294	32,806	11,079
Other druggists' sundries	.....	46,579	.....	83,821
Gum rubber clothing—*doz.*	26,606	46,979	51,153	86,258
Balloons—*gross*	34,941	29,656	63,903	49,865
Toys and balls	.....	5,475	.....	11,525
Bathing caps—*doz.*	4,880	9,631	7,792	14,366
Bands	17,733	7,399	37,685	15,134
Erasers	30,656	19,621	61,436	37,560
Hard rubber goods				
Electrical battery boxes	35,707	20,329	62,582	25,910
Other electrical—*lb.*	45,950	11,028	82,115	21,677
Combs, finished—*doz.*	6,771	4,573	12,358	8,026
Other hard rubber goods	.....	20,954	.....	38,751
Tires				
Truck and bus casings, *number*	11,289	228,925	29,401	579,303
Other automobile casings, *number*	76,270	776,583	137,787	1,386,485
Tubes, auto—*number*	55,245	81,992	108,812	167,010
Other casings and tubes, *number*	7,713	38,833	12,067	75,639
Solid tires for automobiles and motor trucks—*number*	284	8,712	624	17,660
Other solid tires	143,463	22,357	259,117	38,747
Tire sundries and repair materials	.....	47,127	.....	125,349
Rubber and friction tape	50,825	15,250	125,065	34,999
Fan belts for automobiles—*lb.*	60,444	37,177	102,656	62,658
Other rubber and balata belts—*lb.*	200,346	103,068	377,900	194,900
Garden hose—*lb.*	84,578	17,051	144,470	32,204
Other hose and tubing—*lb.*	436,136	165,219	852,254	303,629
Packing	154,556	61,276	293,410	120,943
Mats, matting, flooring, and tiling	99,575	13,491	181,630	28,222
Thread	69,235	32,294	167,539	75,927
Gutta percha manufactures	145,514	44,623	280,671	77,237
Other rubber manufactures	.....	114,361	.....	241,896
Totals	.....	$2,397,876	.....	$4,661,333

Rubber Goods Production Statistics

TIRES AND TUBES*		1937 Feb.	1936 Feb.
Pneumatic casings			
Production	*thousands*	....	3,577
Shipments, total	*thousands*	....	3,211
Domestic	*thousands*	....	3,142
Stocks, end of month	*thousands*	....	9,265
Inner tubes			
Production	*thousands*	....	3,556
Shipments, total	*thousands*	....	3,446
Domestic	*thousands*	....	3,393
Stocks, end of month	*thousands*	....	8,699
Raw material consumed			
Fabrics	*thous. of lbs.*	....	14,888
MISCELLANEOUS PRODUCTS			
Single and double texture proofed fabrics			
Production	*thous. of yds.*	4,342	2,759
Rubber and canvas footwear			
Production, total	*thous. of prs.*	5,935	5,231
Tennis	*thous. of prs.*	3,241	2,498
Waterproof	*thous. of prs.*	2,694	2,732
Shipments, total	*thous. of prs.*	4,520	4,818
Tennis	*thous. of prs.*	3,308	1,929
Waterproof	*thous. of prs.*	1,212	2,890
Shipments, domestic, total	*thous. of prs.*	4,488	4,788
Tennis	*thous. of prs.*	3,291	1,915
Waterproof	*thous. of prs.*	1,195	2,873
Stocks, total, end of month	*thous. of prs.*	14,869	14,957
Tennis	*thous. of prs.*	5,041	7,305
Waterproof	*thous. of prs.*	9,829	7,652

*Data for January to July, 1935, are estimated to represent approximately 97% of the industry; for August, September, October, November, and December, 1935, the coverage is estimated to be 81%.

Source: *Survey of Current Business*, Bureau of Foreign & Domestic Commerce, Washington, D. C.

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

No.	INQUIRY
2298	Manufacturer of Reanite.
2299	Manufacturer of 5/8-inch rubber shock cord.
2300	Manufacturer of molds for small rubber articles.
2301	Manufacturer of hand operated lasting machine called "Conlynn."
2302	Supplier of cotton flocks.
2303	Manufacturer of all-rubber suit (or overalls) for use in the oil industry.
2304	Manufacturer of equipment which removes the moisture from the air used in a vulcanizer.
2305	Supplier of prepared textile material suitable for wrapping around rubber plates of 80° Cel.
2306	Manufacturer of rubber boot vulcanizers.
2307	Manufacturer of latex impregnated paper.
2308	Manufacturer of dipping tanks.
2309	Manufacturer of rubber beer barrels.
2310	Supplier of machinery used to manufacture rubber thread.
2311	Manufacturer of "Rubileu."

Imports by Customs Districts

	March, 1937 *Crude Rubber		March, 1936 *Crude Rubber	
	Pounds	Value	Pounds	Value
Massachusetts	11,905,822	$2,294,408	5,779,635	$761,298
New York	61,497,096	11,481,062	54,696,361	7,254,792
Philadelphia	1,970,128	338,557	2,218,471	295,836
Maryland	2,327,789	413,737	1,419,282	175,294
Mobile	311,307	55,635	.....	.....
New Orleans	1,263,878	222,249	67,200	7,929
Los Angeles	11,111,228	1,962,510	13,727,348	1,741,187
San Francisco	903,393	173,593	100,800	13,738
Oregon	13,440	2,927	.....	.....
Washington	68,320	11,823	.....	.....
Michigan	1,208	302	.....	.....
Ohio	318,078	42,716	198,229	21,011
Colorado	223,950	36,254	.....	.....
Totals	91,915,637	$17,035,773	78,207,326	$10,271,085

*Crude rubber including latex dry rubber content.